



DEVELOPMENT AND QUALITY EVALUATION OF SPINACH NACHOS

Pattan Neeta¹ and Nikhat Aman²

1. Assistant Professor. 2. Post Graduate Student

Department of Food and Nutrition and Research Centre, Smt. V.H.D Central Institute of Home science, Seshadri Road, Bengaluru-560001, Karnataka, India

ABSTRACT

Introduction: *Nachos* are the popular snack of the day. *Nachos* is a Mexican dish from northern Mexico that consists of heated tortilla chips or totopos chips covered with melted cheese, often served as a snack or appetizer. Spinach is an excellent source of vitamins and minerals like vitamin A (in the form of carotenoids), manganese, folate, copper, vitamin B2, vitamin B6, vitamin E, calcium and vitamin C. Spinach is also a very good source of zinc, dietary fiber, phosphorus, vitamin B1 and choline. It contains a unique and beneficial mixture of phytonutrients, as well as antioxidants, flavonoids and carotenoids.

Objectives: A study was undertaken to develop value added nachos using spinach and to evaluate its sensory qualities.

Methodology: The procedure for development of value added, nachos using spinach was standardized. 2 variations of nachos were prepared by substituting maize flour with spinach at 25 per cent and 50 per cent. The developed products were evaluated for its sensory quality by semi trained panelist using 9-point hedonic scale.

Results: Sensory qualities like appearance, color, texture, taste, odor, overall acceptability. were evaluated and the results showed that, means scores for variation I (25%) were on par with the control sample, whereas sensory scores for the variation II (50%) were decreased which may be because of lower scores for taste, color and flavor.

Conclusion: It can be concluded that addition of 25% spinach in nachos was best accepted, with improved the nutritional quality. So, it can be a healthy snack, can be used to replace unhealthy commercially available nachos.

Index Terms - spinach, Nachos, sensory qualities, hedonic scale.

INTRODUCTION:

Green leafy vegetables are used since ancient periods as source of food as they contain many nutrients and minerals which are helpful in maintaining human health. Plant foods are sources of energy, micronutrients, and nutrients essential to health, in addition to phytochemicals with further health benefits including glycaemic control, immuno-stimulation or antioxidant activity. Leafy vegetables hold an important place in well-balanced diets. Green leafy vegetables are the cheapest of all the vegetables within the reach of poor man, being richest in their nutritional value. The chemical constituents present in green leafy vegetables are of great pharmacological or medicinal importance. Phytonutrients present in green leafy vegetables produce many common health benefits like protection from eye problems, oxidative stress, iron deficiency etc.,

Consumption of green leafy foods benefits human health by improving nutritional status and reducing risks of specific diseases like diabetes, cancer, and hepatotoxicity (Banerjee et.al, 2015).

Spinach (*Spinacia oleracea* L.) is widely regarded as a functional food due to its diverse nutritional composition, which includes vitamins and minerals, and to its phytochemicals and bioactive that promote health beyond basic nutrition. (Roberts and Moreau, 2016). Spinach is a good source of vitamins, fiber, and minerals, thus constituting a functional ingredient in a new product with high nutritional and biological values. Spinach is a rich source of major micronutrients such as iron, manganese, zinc, and magnesium and contains small quantities of vitamin E, A, C, K, folate, thiamine (B1), pyridoxine (B6) and riboflavin (B2). Moreover, it is a rich source of fibre and has an added benefit of a low-calorie content. It is present in food in many forms such as raw, canned, boiled, pureed, frozen, dehydrated, cooked, and baked. (Samah and Sayed, 2020)

Deep-fat fried products form the largest group of the marketed snack foods in India and are listed for their crunchy texture and fried aroma. The deep fried snacks, which evolved as snacks between meals in India, have been over a period of time, commercially exploited on a wide scale due to improved living standards, urbanization growth, preference of new generation for fast foods and rise in per capita income. (Kaur and Aggarwal, 2017)

Nachos are a Mexican and international staple. Nachos are the popular snack of the day. Nachos is a Mexican dish from northern Mexico that consists of heated tortilla chips or totopos covered with melted cheese (or a cheese-based sauce), often served as a snack or appetizer. More elaborate versions of the dish include other ingredients and may be substantial enough to serve as a main dish. Ignacio "El Nacho" Anaya is credited for creating the dish in 1943. The original nachos consisted of fried corn tortilla chips covered with melted cheese and sliced jalapeño peppers.

The present study was conducted to develop a value added nachos using spinach and to analyze acceptability using sensory evaluation of the product.

MATERIALS AND METHODS

The ingredients used for preparation of nachos, maize flour, all-purpose flour, fresh spinach and other materials such as, coriander, chillies, garlic, onion, red chili powder, turmeric and garam masala were procured from local market of Bangalore, Karnataka.

Development of spinach nachos:

The basic nachos were prepared with, maize flour-70g, all-purpose flour-30g, onion-25g, 10g of coriander, garlic cloves, green chillies respectively and ½ tsp of red chili, turmeric and garam masala. The procedure of development of nachos was standardized. For the development of value added spinach nachos, 25g of fresh spinach (variation I) was added to the basic nachos during preparation whereas 50g of fresh spinach was added to the basic nachos to develop variation II.

Evaluation of spinach nachos:

The developed spinach nachos and basic sample were evaluated for its sensory qualities. The products were evaluated by 30 semi trained panellists. Nachos were evaluated by each panellist for appearance, texture, colour, flavour, taste, and overall acceptability on a 9-point hedonic scale. The scores between 1 and 9 were given by the judges. Suitable statistical methods were used to analyse sensory scores.

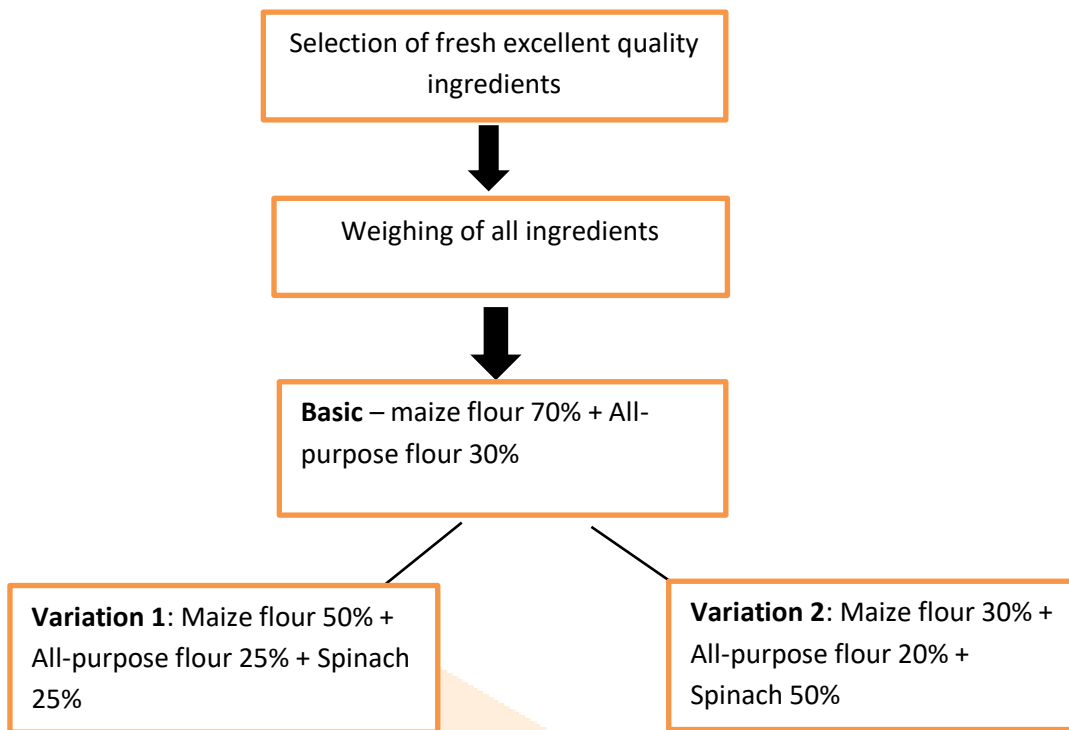
RESULTS AND DISCUSSION:

Fig 1- Standardization of Spinach nachos

Fig1 and Fig 2 shows the standardization of Spinach Nachos preparation and development of its variables. For preparing spinach nachos, ingredients such as maize flour, all-purpose flour, fresh spinach, and other materials such as, coriander, chillies, garlic, onion, red chili powder, turmeric and garam masala needs to be collected. Firstly, blanch the fresh spinach for 1 to 2 minutes then take it out and let it cool. Then in a jar add onion, green chilies, garlic, coriander, and blanched spinach grind it into a fine paste. Then in a bowl add maize flour and all-purpose flour add salt, red chili powder, turmeric, garam masala, oil and add the spinach paste and knead it into soft dough. Later take a small piece of dough and roll it in a form of chapatti. Then cut them into nacho shape. Heat the oil in a pan or kadai then fry the nachos in a medium flame.



Procurement of Ingredients



Blanching of spinach



Grinding



Preparation of Dough

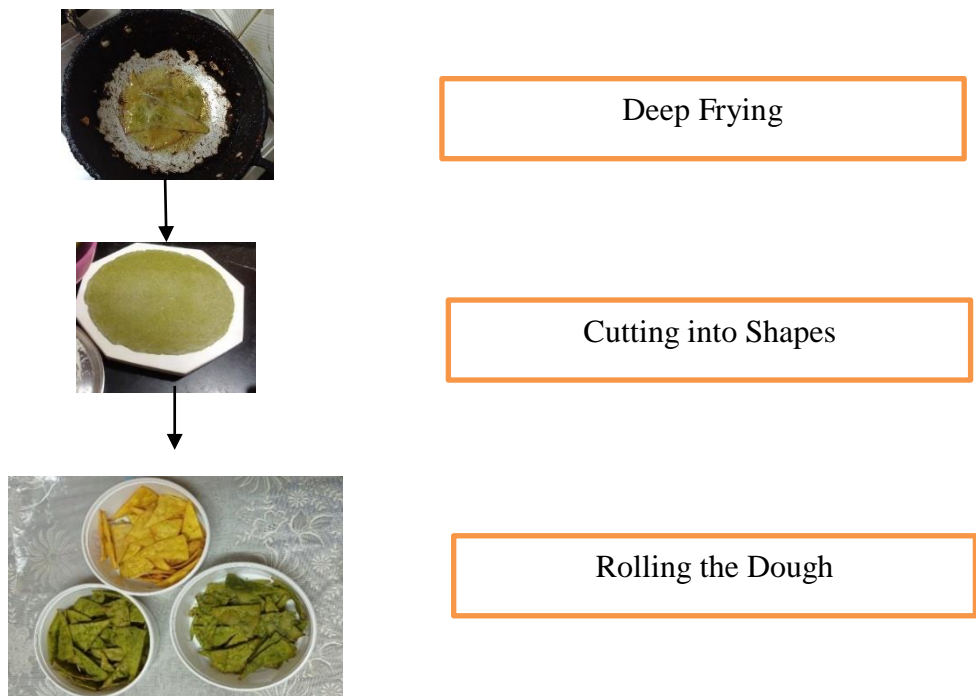


Fig 2: Standardized method of spinach nachos preparation

Table 1: Mean Sensory scores of Spinach Nachos

Attributes	Basic	Variation 1	Variation 2
Appearance	8.2	8.5	7.7
Color	8.3	8.4	7.8
Texture	8.0	8.5	7.2
Taste	8.0	8.7	7.6
Odour	7.8	8.0	7.6
Overall acceptability	8.0	8.7	7.7

From the Table 1, the sensory scores reveal that the appearance and color of variation I (25 % Spinach) was higher compared to control and variation II (50 % Spinach) other variations, In texture variation I was higher, In taste and odour variation I was more accurate compared to other 2 variations, The overall acceptability was higher for variation I that had 25% of spinach content, which was well accepted by the panelist.

MESF (Mechanically Expelled soy flour) can be added at 10-30% levels in tortilla chips. Up to 20% would be recommended and Frying results in higher acceptability consumer scores over baking (Pineda, 2007). Similar study was conducted on biscuits supplemented with spinach biscuits in which, The CB, SB-5%, SB-10% and SB-15% were subjected to sensory evaluation of ten trained panelist from CSIR-CFTRI-RC, Hyderabad, India on their familiarity with the biscuits were used for the evaluation. In case of all attributes SB-5% scored almost nearer to with the control samples, when compared to SB-10 and SB-15%. (Galla rao nursing et.al, 2016)

Another study that was conducted by on use of spinach powder as functional ingredient in the manufacture of UF-Soft cheese, in which, displays the scores for the appearance, flavor, body and texture of cheese made with different levels of added spinach powder during 4 weeks of cold storage. In case of all sensory attributes of cheese with 0.5% scored approximately nearer to with the control samples, when compared to other treatments supplemented with 1, 1.5 and 2% spinach powder. (Samah and Sayed, 2020).

The composition of Spinach Chips was 4.8 mg/ 100 g for vitamin C, 814 mg/ kg for Calcium, 27.4 mg/ kg for Iron and 709.8 mg/ kg for Potassium (Musa et al., 2011). Roa and Sengupta, 2015 concluded that Nutri Nachos were a healthy and nutritious food with safe microorganism load. Incorporation of whole pumpkin flour not only enhanced the nutritional profile of the product, it also improved the quality in term binding, roll ability, flavour and texture in development of composite tortilla chips (Chhabra et al., 2017)

Fortifying noodle by Spinach Extract produced antioxidant rich, low calorie, and preferable- Wet spinach noodles and Spinach Extract concentration of 4 mg/mL was determined as the fortification optimum level (Susanti et al., 2021). Vázquez et al., 2014 concluded that acceptance test indicated that 76% of participants would definitely prefer either control or tortilla chips prepared with up to 4% broccoli flour, when taste, price, appearance, texture and low fat content were the principal factors influencing the preference, concluded that broccoli flour could be incorporated into an innovative formulation to produce tortilla chips with improved physicochemical and nutritional properties. Maize potato tortilla chips were highly acceptable, more nutritious as compared to control ones and had good keeping quality (Kaur and Aggarwal, 2017)

CONCLUSION:

It can be concluded that addition of 25% spinach in nachos was best accepted, with improved the nutritional quality. So, it can be a healthy snack, can be used to replace commercially available nachos.

REFERENCES:

- Alma Rosa Islas-Rubio & Ana María Calderón de la Barca & Luis Enrique Molina-Jacott & María del Carmen Granados-Nevárez & Francisco Vasquez-Lara 2014 Development and Evaluation of a Nutritionally Enhanced Multigrain Tortilla Snack. *Plant Foods Hum Nutr* 69:128–133.
- Banerjee. S, Joglekar. A and Mishra. M, 2015, “A critical review on importance of green leafy vegetables”, *International Journal of Applied Home Science*, 2 (3&4) PP:124-132.
- Galla NurasingRao prabhakara, Balaswamy kalakara, Gurusiddaiah Rudrayya Math and Akula Satyanarayana, 2016, “Nutritional, textural, and sensory quality of biscuits supplemented with spinach”, *International Journal of Gastronomy and Food Science*, 7 PP:20-26.
- Kaur Sukhpreet and Aggarwal Poonam, 2017, “Development of maize-potato tortilla chips: A nutritious and low-fat snack food”, *Journal of Pharmacognosy and Phytochemistry*, 6(5) PP:153-161.
- Khan M.A, Mahesh C, Semwal Dutt Anil and Sharma G.K, 2013, “Effect of spinach powder on physico-chemical, rheological, nutritional, and sensory characteristics of chapatti premixes”, *Food Sci Technol*, 52(4) PP:2359-2365.
- Monica De La Torre Pineda , 2007, Fortification Of Baked And Fried Tortilla Chips With Mechanically Expelled Soy Flour. A Thesis By Submitted To The Office Of Graduate Studies Of Texas A&M University
- Musa Nurhazwani, Nazikussabah Zaharudin , Farahanim Misni and Siti Maznah Kabeb, 2011, Determination of Vitamin C and Mineral from Spinach (*Amaranthus Viridis*) Chips for Nutrient Facts. *INTERNATIONAL HEALTH CONFERENCE (ICHI 2011) : 1-4*
- Nisha Chhabra, Amarjeet Kaur and Sukhpreet Kaur, 2017, Development of composite tortilla chips: An approach with improved quality. *The Pharma Innovation Journal* 2017; 6(9): 514-520
- Roberts L Joseph and Moreau Regis, 2016, “Functional properties of spinach (*Spinacia oleracea* L.) phytochemicals and bioactives”, *Food Funct*, 7(8) PP:37-53.
- Samah M. and Sayed EL, 2020, “Use of spinach powder as functional ingredient in the manufacture of UF-Soft cheese”, *Heliyon*, 6(1).
- Suhasini Rao and Rupali Sengupta, 2015, Nutri Nachos – A Healthy Snack For Life Style Disorder. *International Journal of Food And Nutritional Sciences*, Volume 4, Issue 4: 2320-7876
- Sukhpreet Kaur and Poonam Aggarwal, 2017, Development of maize-potato tortilla chips: A nutritious and low fat snack food. *Journal of Pharmacognosy and Phytochemistry ; 6(4): 153-161*
- Susanti, S., Dwiloka, B., Bintoro, V.P., Hintono, A., Nurwantoro, N. and Setiani, B.E., 2021, Antioxidant status, nutrition facts, and sensory of spinach extract fortified wet noodles. *Food Research* 5 (6) : 266 - 273
- Vázquez-Durán – Andrés Gallegos-Soto – Hugo Bernal-Barragán – Mercedes López-Pérez – Abraham Méndez-Albores, 2014, Physicochemical, nutritional and sensory properties of deep fat-fried fortified tortilla chips with broccoli (*Brassica oleracea* L. convar. *italica* Plenck) flour. *Journal of Food and Nutrition Research* Vol. 53, No.4: 313–323