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FORMULATION AND QUALITY EVALUATION OF NACHOS INCORPORATED WITH POMEGRANATE SEED POWDER

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ABSTRACT

Nachos, a popular snack, were selected for their versatility and consumer appeal, while the addition of nutrient-dense ingredients aims to enhance their nutritional value. The study first explores the nutritional composition of each added ingredient: pomegranate seed powder, known for its high antioxidant content; foxtail millet, rich in dietary fibre and essential minerals; and corn flour, chosen for its textural properties and gluten-free nature. Methodologically, formulations were developed with varying proportions of these ingredients to optimize nutritional benefits without compromising taste and texture. Sensory evaluations were conducted using a trained panel to assess attributes such as taste, crunchiness, aroma, and overall acceptability compared to traditional nachos. Incorporating pomegranate seed powder, foxtail millet, and corn flour into nachos offers a viable strategy to boost nutritional value. The enriched nachos demonstrated favorable sensory attributes, with panelists noting a pleasant balance between traditional flavors and enhanced health benefits.

Keywords: Nachos, pomegranate seed powder, antioxidants, nutrition, gluten free.

INTRODUCTION:

Pomegranate seed powder is derived from the seeds of the pomegranate fruit (*Punica granatum*). Known for its vibrant ruby-red colour and distinctive flavour, pomegranate seed powder offers a concentrated form of the fruit's nutritional benefits. Pomegranate seed powder is often used to enhance the flavour and nutritional profile of various dishes, including snacks, beverages, and desserts. Its tangy and slightly sweet taste adds a refreshing twist to recipes while providing a boost of essential nutrients. The powder derived from pomegranate seeds retains much of the fruit's nutritional benefits, including high levels of vitamins C and K, as well as phytochemicals such as polyphenols, which contribute to its antioxidant capacity. Pomegranate seeds may have the potential to be a rich source of nutrients and antioxidants, according to recent studies. Dried pomegranate seed residue has a high concentration of bioactive substances such as hydrolysable tannins (ellagitannin, punicalagin, punicalin, and pedunculagin), flavonoids, anthocyanins, and other phenolic compounds (Li et al., 2016).

Foxtail millet (*Setaria italica*) is an ancient grain widely cultivated in Asia and parts of Africa, cherished for its nutritional richness and versatile culinary applications. This small-seeded cereal grain is gluten-free, making it suitable for individuals with gluten intolerance or celiac disease. Nutritionally, foxtail millet is a powerhouse. It is rich in dietary fiber, which supports digestive health and promotes a feeling of fullness. Additionally, foxtail millet is a good source of essential minerals such as iron, magnesium, phosphorus, and potassium, crucial for maintaining overall health. Foxtail millet is rich in nutrients including essential amino acids, fatty acids and minerals. It is suitable for individuals suffering from diabetes mellitus due to its low glycemic index. (Thathola et al., 2011).

Corn flour, also known as maize flour, is a staple ingredient derived from ground maize kernels. Corn flour is notably gluten-free, making it suitable for individuals with gluten intolerance or celiac disease, and it serves as a cornerstone in the production of gluten-free products. Nutritionally, corn flour is rich in carbohydrates, providing a sustainable source of energy. It also contains dietary fibre, which supports digestive health and promotes a feeling of fullness. Corn flour is fortified with essential vitamins and minerals, including vitamin A, niacin (vitamin B3), and iron, enhancing its nutritional value. Nachos are not only a popular appetizer in restaurants and sports bars but also a versatile dish enjoyed at home gatherings and social events. Originating in Mexico in the mid-20th century, nachos traditionally consist of tortilla chips topped with melted cheese and jalapeño peppers. Combining foxtail millet flour, corn flour, and pomegranate seed powder in nachos offers a range of benefits that enhance both flavour and nutritional value. Together, these ingredients not only diversify the taste profile of traditional nachos but also elevate their nutritional profile, offering a delicious and wholesome snack option that combines flavor innovation with health benefits.

MATERIAL AND METHODS:

Materials

Pomegranate seed powder, foxtail millet flour, corn flour, salt, vegetable oil, baking soda, seasonings.

Pomegranate Seed Powder:

Obtained from pomegranate seeds (*Punica granatum*) processed into a fine powder. Pomegranate seed powder is rich in antioxidants and fiber, making it a nutritious

ingredient.

Foxtail Millet Flour:- Flour derived from foxtail millet grains (*Setaria italica*). Foxtail millet is valued for its high nutritional content, including protein, fibre, and minerals.

Corn Flour: Fine flour obtained from ground corn (*Zea mays*). Corn flour adds texture and sweetness to the final product.

Salt: Table salt used for seasoning. Salt enhances the flavour of the product.

Vegetable Oil: Any neutral vegetable oil used in cooking (e.g., canola oil, sunflower oil). Oil is essential for binding the ingredients and adding moisture.

Baking Soda: Sodium bicarbonate used as a leavening agent. Baking soda helps the dough rise, making the final product lighter and more airy.

Seasonings: A mix of preferred spices and herbs for flavor enhancement. Seasonings are added to improve the taste and aroma of the final product.

Methods

Preparation of pomegranate seed powder:

Take the fresh pomegranate fruit. Cut the pomegranate into quarters and gently remove the seeds from the fruit. Spread the pomegranate seeds evenly on a baking sheet lined with parchment paper. Make sure they are in a single layer to ensure even drying. Place the baking sheet in an oven set to the lowest temperature, typically around 150°F (65°C). Let the seeds dry out slowly for several hours, stirring occasionally, until they become crisp and dry to the touch. This process usually takes 6-12 hours depending on the method and humidity levels. Allow the dried pomegranate seeds to cool completely before proceeding. Transfer the dried seeds into a blender or spice grinder in batches. Grind them into a fine powder.

Preparation of foxtail millet flour: Foxtail millet flour is made by cleaning and drying foxtail millet grains, then grinding them into a fine powder.

Preparation of corn flour: Corn flour is produced by milling dried corn kernels into a fine, powdery consistency. First, the corn kernels are thoroughly cleaned and dried to reduce moisture content. They are then ground using specialized mills or grinders to achieve the desired smoothness.

Preparation of nachos: In a mixing bowl, combine corn flour, foxtail millet flour, pomegranate seed powder, and salt. Gradually add water and knead into smooth dough. Adjust water as necessary to achieve a pliable consistency. Divide the dough into small portions and roll each portion into thin discs or shapes of your choice. Heat oil in a deep frying pan. Fry the nacho shapes in batches until they are crispy and golden brown. Add seasonings to get extra flavor. In this way it was proposed with 3 different formulations.

Table 1: Different formulation tested for Nachos incorporated with seed powder

S.#	Sample	Treatment 1	Treatment 2	Treatment 3
1.	Pomegranate seed powder	20 gm	15 gm	25 gm
2.	Foxtail millet flour	55 gm	55 gm	45 gm
3.	Corn flour	20 gm	25 gm	25 gm

4.	Baking soda	4 gm	3 gm	5 gm
5.	Salt	1 gm	1 gm	1 gm

Physico- chemical analysis

Brix: A refractometer is the primary tool for measuring Brix. It measures the bending of light as it passes through the sample, providing a Brix reading directly. Squeeze a few drops of juice or extract onto the refractometer prism. Close the cover gently to spread the sample evenly. Look through the eyepiece or digital display of the refractometer to read the Brix value. This value represents the percentage of sugar by weight in the sample.

Titration acidity: The procedure for measuring titration acidity involves preparing a sample of the substance, adding a standardized base solution incrementally while stirring, and using an indicator to detect the endpoint of neutralization, typically indicated by a colour change. The volume of base solution used at the endpoint is recorded and used to calculate the titration acidity, which is expressed as the amount of acid present in the sample. This method is widely used in food and beverage industries to assess acidity levels for quality control and regulatory compliance purposes.

$$\text{Titration acidity} = (N * \text{volume of burette solution consumed} * C * 100) / S * 1000$$

N = 0.1N NaOH solution

C = citric acid equivalent

S = weight of the sample

For the sensory analysis the samples were placed in disposable cups and given with random numbers. Each assessor received nachos formulations and a sheet of paper with a questionnaire and a hedonic scale to assess the appearance, colour, flavour and texture ranging from nine to one (9 - I liked it very much, 8 - I enjoyed it, 7 - I liked it regularly, 6 - I liked it a little, 5 - indifferent - I didn't like or dislike it, 4 - I disliked a little, 3 - I regularly disliked it to moderately disliked it, 2 - I disliked it, and 1 - I extremely disliked it). The results are as follows:

Table 2 : Sensory Evaluation

S. no	Sensory attributes	Treatment 1	Treatment 2	Treatment 3
1	Colour	7	8	7
2	Taste	7	8	7
3	Flavour/odour	7	9	7
4	Texture	8	8	7
5	Acceptance	7	8.5	7

Result and Discussion

The taste attributes were rated very similar for two of the developed formulations. The texture of the product is slightly different and soft. Treatment 2 is finalized as it is good in taste and its texture when compared to treatment 2 and treatment 3. Trail 1 is rejected due to its taste and its taste and Trail 3 is rejected as it is not satisfying the attributes compared to other 2 formulations.

Table 3 shows the moisture 2% , ash 1%, energy 350g , carbohydrates 30% , vitamin c 150 mg. It is preferable by all age groups because it has more energy and vitamin c content than carbohydrates.

Table 3 : Nutritional analysis of Nachos

S no	Nutrient	Values
1	Moisture	2%
2	Ash	1%
3	Energy	350 g.
4	Carbohdrates	30%
5	Vitamins	150 g.

Table 4 : Physico – chemical Analysis of Nachos

S #	Parameter	Values
1.	Brix	1.5
2.	Acidity	0.15
3	pH	5.8

Table 5 shows that the developed nachos were rich in fibre and proteins and has less amount of fats, previous journals shows that the moisture content in Nachos was 4.84%. Ash content was 3.87%, Protein was 26.01%, Carbohydrate was 37.23%, Fat was 28.02% and calories found was 505.14 Kcal (Pratik Anant Thakar et., al 2023).

Table 5: Parameter Analysis of Nachos

S#	Parameter	Values
1	Fat	10%
2	Fibre	29%
3	Carbohydrates	30%
4	Protein	15%
5	Moisture	2%

CONCLUSION:

Nachos enriched with pomegranate seed powder, foxtail millet, and corn flour represents a promising approach to innovate within the snack food industry. This study has demonstrated that these ingredients can be successfully integrated into traditional nacho recipes to enhance their nutritional profile. Sensory evaluations indicated that the enriched nachos maintained satisfactory texture and taste. Based on overall statistical analysis of all attributes T2 was mostly preferred by sensory panel which has good flavour, smell, taste and offer nutritious element like vitamin c. The developed formulation is healthy when compared to commercial nachos.

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