Formulation And Nutritional Development of Aloevera Based Nachos

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Abstract- This study presents the development of functional and nutritional aloevera nachos. Nachos, originating from northern Mexico, are traditionally made using maize flour and commonly served as appetizers or snacks. Alovera powder and barley flour, a nutritious alternative to maize, boosts high levels of iron, protein, heart health, weight management, and suitable for the people with cancer. This research was conducted to develop a value-based product with antioxidant power and carbohydrate content than standard nachos. The study involved preparation of Nachos by replacing a portion of Barley flour and alovera powder with in various ratios. The sensory quality of the developed Nachos was then assessed, and the proximate composition of both the modified version and traditionally prepared Nachos was estimated for comparison. The growing demand for functional and nutritious snack options has led to innovative approaches in product development, particularly in the incorporation of health-promoting ingredients into traditional snacks. This study focuses on the formulation and evaluation of nachos fortified with barley flour and aloe vera. Barley flour, known for its high dietary fiber and beta-glucan content, was blended with wheat flour to enhance the nutritional value and texture of the nachos. Aloe vera, recognized for its antioxidant, anti-inflammatory, and digestive properties, was incorporated in the form of gel or pulp to further boost the health benefits of the final product.

Among the variations, the 30% substitution of wheat flour with Barley flour was notably well-received by semi-trained sensory panelists. Proximate analysis of this chosen variation revealed carbohydrates but higher fiber and iron content.

Keywords: Barley flour; Alovera powder; maize flour; Oregano; sesame seeds; Nutritious snacks, Fibrerich.

1.INTRODUCTION

In recent years, there has been a growing global interest in functional foods—those offer health benefits beyond basic nutrition. Nachos, a Mexican dish, are prepared from corn or wheat flour to form tortilla chips. Also known as Tortilla chips, nachos are a crucial culinary delight in Mexico, America, and Colombia. These fried or baked chips come in various sizes and shapes, such as square, round, triangular, and rhombus. Nachos, a popular snack, can be served with or without sauces and spices based on individual preferences. With their rich composition of carbohydrates, protein, and fats, nachos exhibit excellent sensory and nutritional characteristics. In recent years, the rising demand for appetizing snacks like nachos has emphasized the need for mechanized production and standardized processes to meet market requirements. Millets are the oldest crops known, whose origin dates back to 4000 years ago. They are ranked as the world's sixth most crucial crop and sustaining one-third of the global population, are renowned for their nutritional superiority over other major grains. Referred to as "Nutri-Cereals". This nutritious grain stands out as a compelling substitute to wheat, boasting higher levels of protein, fiber, and minerals. Recognized by the Indian Council of Agricultural Research and the Indian Institute, millets, including little millet, hold the potential to address global challenges related to population growth, hunger, and food shortages.

In recent years, barley flour has garnered attention due to its high dietary fiber content, particularly β-glucan, which is known for its cholesterol-lowering effects and role in glycemic control. Incorporating barley flour into nacho formulations not only enriches the

product with soluble fiber but also enhances its nutritional profile with essential vitamins and minerals. Aloe vera powder, another innovative addition, is valued for its bioactive compounds including polysaccharides, antioxidants, and vitamins, which offer anti-inflammatory, antimicrobial, and immunomodulatory properties. The integration of aloe vera powder into snack foods such as nachos introduces functional benefits and aligns with the growing trend of incorporating plant-based nutraceuticals into everyday diets. This study aims to develop a novel nacho product by partially replacing traditional maize flour with barley flour and supplementing it with aloe vera powder to create a functional snack that balances health benefits with sensory appeal.

The first known appearance of the word "nachos" in English dates to 1949, from the book A Taste of Texas. According to El Cholo Spanish Cafe history, waitress Carmen Rocha is credited with making nachos in San Antonio, Texas, before introducing the dish to Los Angeles at the cafe in 1959. A modified version of the dish, with cheese sauce and prepared tortilla chips, was marketed in 1976 by Frank Liberto, owner of Ricos Products, during Texas Rangers baseball games at Arlington Stadium in Arlington, Texas. This version became known as "ballpark nachos". During the September 4, 1978 Monday Night Football game between the Baltimore Colts and Dallas Cowboys, sportscaster Howard Cosell enjoyed the name "nachos," and made a point of mentioning the dish in his broadcasts over the following weeks, further popularizing it and introducing it to a whole new audience. Liberto died in 2017. Ignacio Anaya died in 1975. In his honor, a bronze plaque was erected in Piedras Negras, and October 21 was declared the International Day of the Nacho. Anaya's son, Ignacio Anaya, Jr., served as a judge at the annual nacho competition.

A single serving of nachos also contains significant amounts of fat, sodium, and calcium. There are around 16 grams of fat, 816 mg of sodium, and 272 mg of calcium per serving of nachos. In other words, one serving contains 39% of the daily value for fat, 34% of the daily value for sodium, and 27% of the daily value for calcium.

2. REVIEW OF LITERATURE

The belief that nachos are nutritious than normal snacks ones due to the presence of aloevera powder. Snack foods, especially savory products like nachos, have become an integral part of global eating habits due to their convenience, palatability, and widespread availability. However, traditional snacks are often characterized by high levels of refined carbohydrates, saturated fats, sodium, and low dietary fiber content, raising concerns over their long-term impacts on public health (Popkin & Hawkes, 2016). As a result, research in recent decades has shifted toward developing nutritionally improved snack alternatives that can meet consumer demand without compromising health. Nachos, traditionally made from corn flour and deep-fried or baked, serve as a base for numerous snack innovations.

Several studies have explored the reformulation of nachos using whole grains, legumes, and alternative flours to enhance their nutritional profile. According to Singh et al. (2017), substituting corn flour with multigrain or legume-based flours, such as chickpea, lentil, and barley flour, can increase protein, fiber, and micronutrient levels, while also lowering the glycemic index. In particular, the incorporation of barley flour—known for its high beta-glucan content—has been linked to improved cholesterol-lowering and glycemic control effects in functional food products (Wood, 2007; Ahmad et al., 2020).

The sensory quality and textural properties of snacks are critical for consumer acceptance. Research by Sharma and Gujral (2014) noted that partial replacement of refined flours with barley or other whole grain flours can affect the texture, color, and crunchiness of snacks, but these effects can often be optimized with the right flour ratios and processing methods such as baking, extrusion, or air-frying.

In terms of processing, extrusion technology has been widely studied as a tool to produce nutrient-dense, low-fat snacks, using blends of cereals, pulses, and pseudocereals (Mishra et al., 2019). Studies also emphasize the role of pre-processing techniques like roasting, soaking, and fermentation in improving both the digestibility and sensory acceptability of grain-based snacks (Patel & Naik, 2015) With increasing interest in functional foods, snacks are being repositioned not only as indulgent items but also as carriers of health benefits.

3.MATERIALS AND METHODS

3.1. Ingredients and Method

The formulation of Aloevera Nachos was carried out using traditional, nutrient rich and clean label ingredients. To prepare nachos using healthy and unique ingredients, combine 1 cup of maize flour, ½ cup of barley flour, 1 tablespoon of aloe vera powder, 1 teaspoon of oregano, 1 tablespoon of sesame seeds, ½ teaspoon of chilli powder, and ½ teaspoon of salt in a mixing bowl. Add 2 tablespoons of olive oil and mix well, gradually adding warm water (around ¼ to ⅓ cup) to knead into a smooth but firm dough. Let the dough rest for 10 minutes. Roll the dough thin between two sheets of parchment paper and cut it into triangle shapes. Arrange the triangles on a baking tray lined with parchment, lightly brush with olive oil, and bake in a preheated oven at 180°C (350°F) for 12–15 minutes or until crisp and golden. Let cool and serve with your favorite dip.

3.2. Evaluation of Organoleptic Properties of Nachos

The developed product was subjected for the organoleptic properties using nine-point hedonic scale which ranges from (0-9) by semi-trained panelists. All six formulations including control were evaluated to consider for further analysis.

3.3. Nutritional analysis of aloe vera nachos

The nutritional analysis involved triplicate assessments using established A.O.A.C. (2005) methods. 9,10 Crude fiber content was evaluated using a crude fiber analyzer. Carbohydrate content was computed by deducting the sum of moisture, protein, fat, and ash content from 100 per 100g of the sample. Moisture content was determined via a hot air oven at 98 to 100◦C, protein content using the Micro-Kjeldhal method for total nitrogen, ash percentage through high-temperature incineration (600◦C) in a muffle furnace, and fat content estimated using the Soxhlet apparatus.11 Crude fiber content was evaluated using a crude fiber analyzer.12 Carbohydrate content was computed by deducting the sum of moisture, protein, fat, and ash content from 100 per 100g of the sample. Energy values were computed by the formula:

Energy value = Protein (g) × + Carbohydrate (g) × + Fat (g) x

Furthermore, mineral analysis of iron, and phosphorus, employed Atomic Absorption Spectrometry (AAS) for its recognized accuracy and precision.

4. RESULTS AND DISCUSSION

4.1. Sample Preparation

Accurately weigh approximately 1–2 g of the ice cream sample and transfer it into a Kjeldahl digestion flask. Add 10–15 mL of concentrated sulfuric acid, followed by a catalyst mixture containing about 0.7 g of potassium sulfate and 0.03 g of copper sulfate. Heat the mixture gently until frothing subsides, then boil continuously until the solution becomes clear, typically requiring 1–2 hours. After digestion, allow the solution to cool and dilute it with distilled water to a fixed volume, usually 250 mL. Transfer a measured aliquot, such as 10 mL, of the digested solution into a distillation apparatus. Add 10 mL of 40% sodium hydroxide solution to render the mixture strongly alkaline. Distill the liberated ammonia into a receiving flask containing 10 mL of 4% boric acid solution with a few drops of mixed indicator. Continue the distillation process until approximately 50 mL of distillate is collected. Finally, titrate the absorbed ammonia in the boric acid solution using standard 0.1 N hydrochloric acid (HCl) until the endpoint is indicated by a color change from green to pink.

4.2. Formulation Trails and Optimization

Three trial formulations of Aloe vera Nachos were developed to optimize nutritional quality, textural attributes, and sensory acceptability. The trials were systematically varied in ingredient proportions, with a focus on key components such asAloevera Powder, Barley Flour, Maize flour, Sesame seeds, Oregano. The ingredient compositions are summarized in Table 1.

Fig-1: Aloe vera Nachos in variable Proportions

Table 1: Formulation of product (ingredients g /100g) for preparation of Aloe vera Nachos.

Ingredients	Trail-1	Trail-2	Trail-3
Maize flour	250g	170g	120g
Aloevera Powder	20g	10g	5g
Barley flour	100g	70g	60g
Oregano	5g	3.5g	2g
Olive oil	50ml	25ml	15ml
Sesame seeds	100g	75g	50g
Chilly Powder	1g	1g	1g
Salt	2.5g	2.5g	2.5g

Table 2: Sensory scores of different variations of nachos development from aloevera powder, barley flour.

Parameter	Control	10% Variation	20% Variation	30% Variation
Appearance	9	8	8	9
Colour	9	6	8	9
Texture	9	7	8	9
Flavour	9	8	7	8.5
Taste	9	8	7	8.5
Overall acceptability	9	8	8	9

Table 3: Proximate composition of Nachos developed from Barley flour and Aloe vera powder

S.No	Nutreints	30% Variation
1.	Energy	300 cal
2.	Protein	17.43
3.	Fat	16
4.	Fiber	2.5
5.	Moisture	4.52
6.	Ph	6.17
7.	Carbohydrates	18
8.	Acidity	0.27

4.3. Nutritional and Functional Benefits

Nachos can offer functional and nutritional benefits when made with wholesome ingredients. Nutritionally, they can provide a good source of complex carbohydrates, dietary fiber, protein, and healthy fats, depending on the flours and toppings used.

Nachos made with ingredients like aloe vera powder, barley flour, maize flour, oregano, olive oil, salt, sesame seeds, and chili powder offer a unique combination of nutritional and functional benefits. Barley and maize flours provide dietary fiber, aiding digestion and promoting satiety, while aloe vera powder contributes bioactive compounds with anti-inflammatory and antioxidant properties. Olive oil delivers heart-healthy monounsaturated fats, and sesame seeds are rich in essential minerals like calcium and magnesium. Oregano adds flavor along with antimicrobial and antioxidant effects, and chili powder may boost metabolism through its active compound, capsaicin. Together, these ingredients enhance the snack's health profile, offering a functional twist to traditional nachos with improved gut health, immune support, and anti-inflammatory benefits.

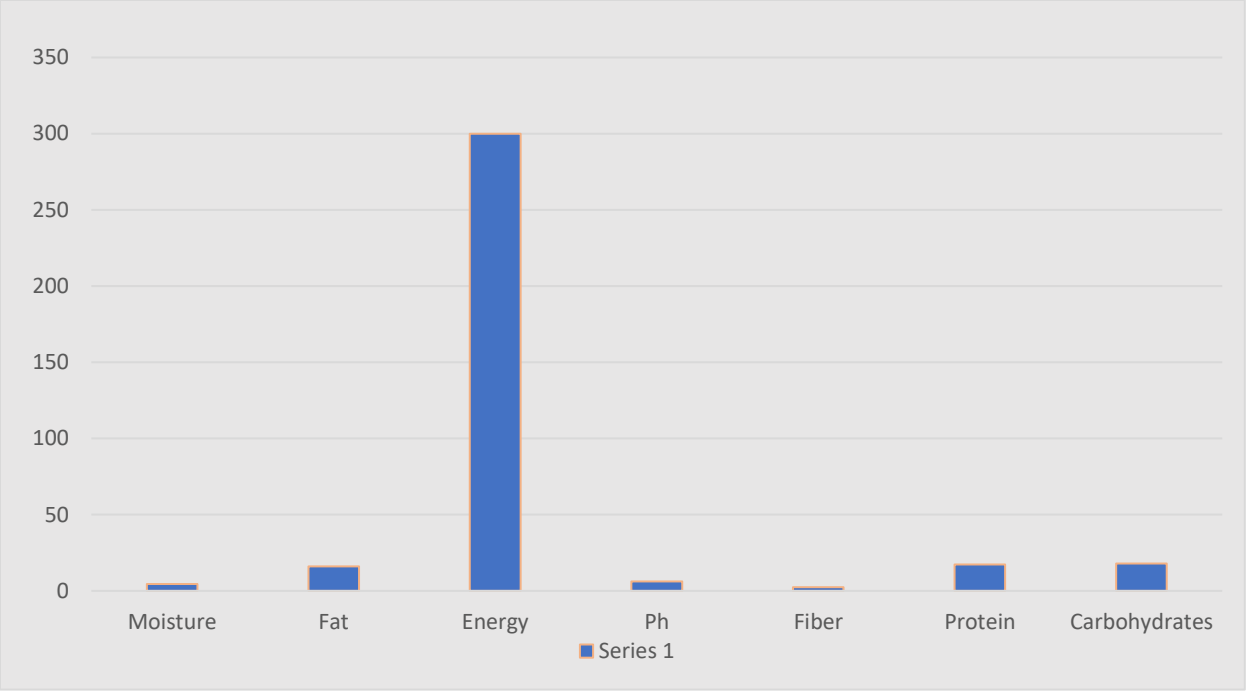

Fig-2: Bar chart representing the proximate composition of Trail-3 Aloevera Nachos, highlighting the percentage of Energy, moisture, fat, protein, Fibre, Carbohydrates, Iron based on standard AOAC analysis methods.

CONCLUSION

"Incorporating Aoevera powder into barley flour nachos has proven to be a novel and intriguing experiment. Aloevera powder's unique texture and nutritional benefits blend seamlessly with the crispy base of barley flour, creating a delightful fusion of flavors. The addition of aloeverapowder not only enhances the nacho's taste but also introduces potential health benefits such as improved digestion and enhanced nutrient absorption.

This innovative combination offers a refreshing alternative in the realm of snacks, catering to both taste and health-conscious consumers. Further exploration into different ratios and methods of incorporating aloevera powder could unveil even more exciting variations and applications in culinary creations. Overall, Aloevera Nachos with barley flour presents a promising opportunity for culinary innovation, appealing to a diverse audience seeking both flavor experimentation and nutritional enrichment.

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considered the heartland of Tex-Mex culture, partly defined by its distinct food such as fajitas, nachos, and enchiladas.

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