Wheat, Oats, Semolina Churros

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ABSTRACT

Invasive Ductal Carcinoma (IDC) is the most common type of breast cancer, accounting for 70-80% of total breast cancer cases. The traditional method of detecting IDC breast cancer is time-consuming and prone to human error, as doctors manually recommend a cancer diagnosis based on their expertise. Pathologists examine IDC using a microscope to analyze hematoxylin and eosin (H&E) stained slides, which is very time-consuming and prone to human error. Today, digital technology uses deep learning (DL) models to quickly and reliably search and analyze IDC images. These models analyze H^E-stained tissue slides and mainly use public datasets such as The Cancer Genome Atlas (TCGA) and BreakHis. This study explores the application of deep learning techniques to predict IDC using histopathological tissue slice images. The proposed solution achieved an accuracy of 92%, a sensitivity of 89%, and a specificity of 94%. The results of this study show that DL models can provide reliable and interpretable predictions that can assist pathologists in clinical decision-making.

INTRODUCTION

Churros is a type of fried dough made from oats flour, wheat flour, semolina, and jaggery. Churros is popular in France, the Philippines, Portugal, Thailand, and America. The shape is a long stick with a soft and crispy texture. Nowadays it is enhanced to produce in many shapes for variety such as long stick, round, and heart shapes. Churros discusses the nutritional benefits and culinary purposes of various ingredients used in churros. Oat flour is a nutrient-rich, gluten-free option that enhances texture and moisture Duan, (2023). Wheat flour, with its varying gluten content, provides essential structure and consistency in baked goods. Semolina, derived from durum wheat, adds a unique crispy texture and acts as a binding agent Singh, (2024). Jaggery, a natural sweetener, offers a healthier alternative to sugar, contributing a distinctive flavor. Together, these ingredients create a wholesome and flavorful twist on traditional churros, enhancing their nutritional value and taste Hirpara, (2020).

OBJECTIVE OF WOS CHURROS

The objective includes that it improve the nutritional profile by incorporating oat flour, wheat flour, semolina, and jaggery. Achieve desirable sensory attributes through optimal ingredient blends. Provide a more nutritious option to traditional churros, appealing to health-conscious consumers. Explore various uses of churros in different meal contexts or as snacks. Align with trends favoring wholesome, natural ingredients in food products.

MATERIALS

Raw material for making churros are the main ingredients of churros were water 500ml, butter 2 Tsp, Oats flour 48.25% whole-wheat flour 31.9%, semolina(suji) 20.4%, Jaggery 18.2 grams, baking soda 2 tsp, egg (1 egg), Cooking oil for frying.

METHODOLOGY

The WOS batter was prepared by adding butter to two cups of water, the water was warm until the butter melted then flour mix was added to it, and the flour and water were well combined in a non-stick pan. Cool down until mild and warm. Now add 1 beaten egg to the batter mixture and mix well until combined. Cool down the batter, take some batter, and shape it in the form of churros Heat oil until frying point, and set the heat on low to medium. Fry the churros in oil.

Assay Methods in Methodology

- Viscosity Test
- Sensory Evaluation (Texture and Taste Assay)
- Moisture Content Assay
- Oil Absorption Assay
- Shape and Size Consistency Assay
- Color Analysis

These assay methods would be valuable in evaluating different stages of the churro preparation process, ensuring the batter, frying, and final product meet the desired standards.

RESULT

Testing	Reading 01	Reading 02	Reading 03	Mean	Standard Deviation
Protein Analysis	0.0126±0.01%	0.0127±0.01%	0.0126±0.01%	0.0126±0.01%	0.02±0.01
Fat Analysis	15±0.5%	14±0.5%	15±0.5%	15±0.5%	0.054±0.5
Carbohydrate Analysis	61.0±1.0%	61.0±1.0%	62.0±1.0%	61.0±1.0%	0.054±1.0
Color Analysis	L*63.43,a*0.02,b*2.84	L*63.43,a*0.01, b*2.83	L*64.43, a*0.02,b*2.84	L*63.4,a*0.02,b*2.8	0.077±0.1
Gluten Analysis	53.9±0.1%	53.8±0.1%	53.7±0.1%	53.8±0.1%	0.054±0.1
Texture Analyzer	19.8mm and 0.065N	19.7mm and 0.064N	19.8mm and 0.065N	19.8mm and 0.065N	0.054±0.1
Ash Content	70.1±0.1%	69.0±0.1%	70.2±0.1%	69.9±0.1%	0.460±0.1
Moisture Analyzer	57.5±0.5%	56.5±0.5%	57.4±0.5%	57.5±0.5%	0.550±0.5
Dimensions	7.5×1.5cm	7.6×1.5cm	7.5×1.6cm	7.5×1.5cm	0.054±0.1
Oil Absorption	5ml	6ml	5.5ml	5ml	0.644±1.0

Protein Analysis

Protein is an essential nutrient required for various physiological functions, including muscle repair, enzyme catalysis, and immune function. Protein analysis of churros was conducted using the Kjeldahl method, revealing that churros contain 0.0126% crude protein per gram. This suggests a moderate level of protein, contributing to the overall nutritional profile of the product (Moolwong, 2020).

Carbohydrate Analysis

Carbohydrates are the primary energy source for the body, fueling cellular functions and metabolic processes. Carbohydrate analysis of churros revealed that they consist of 61.0% carbohydrates, approximately 7.33 grams per churro. This indicates a significant carbohydrate content, contributing to the energy density of the churros (BeMiller, 2017).

Fat Analysis

Fats are vital for energy storage, hormone production, and cell membrane integrity. The fat content of churros was analyzed using a Soxhlet apparatus, resulting in 15% fat or 1.8 grams per churro. This fat contributes not only to the energy content but also to the sensory characteristics such as flavor and texture (Singh, 2024).

Ash Content

Minerals act as essential micronutrients, helping regulate body processes such as fluid balance and nerve function. Ash content, representing the mineral composition of churros, was found to be 70%, or 9.2 grams per churro, indicating a considerable presence of inorganic nutrients that may include electrolytes like sodium, potassium, and calcium (Afzal, 2013).

Moisture Content

Moisture content is an important factor in determining the texture and shelf life of a food product. Using the drying method, it was found that churros contain 57.5% moisture, or 6.9 grams per churro. This significant moisture content helps maintain the texture but may limit the shelf life, promoting microbial growth in stored products (Meloan, n.d.).

Texture Analysis

The texture of churros was evaluated using a texture analyzer, which recorded a deformation of 19.8mm when subjected to a force of 0.065 N. The texture is a critical factor in determining the product's quality, as it influences its crispness, chewiness, and overall mouthfeel (Gómez & Valero, 2015).

Oil Absorption

Oil absorption is a significant factor in fried food products, influencing both the caloric value and sensory attributes. Churros were found to absorb approximately 5 ml of oil each during frying. This oil absorption contributes to the caloric density and may impact the nutritional profile of the churros (SpringerLink, 2012).

Dimensions

The dimensions of churros were measured and found to be cylindrical in shape with rounded edges, having a length of 7.5 cm and a diameter of 1.5 cm. These dimensions are typical of churros and play a role in uniform cooking and texture (Chu, 2004).

Shelf Life

The shelf life of churros depends on their storage form. Frozen churros can maintain quality for 2 to 3 months, while fried churros have a much shorter shelf life of just one day, primarily due to their high moisture content and susceptibility to microbial contamination (Valero, 2012).

Color Analysis

The color of churros was assessed using colorimetry, revealing an L* value indicating a light tone between white and black, with a* and b* values that point to reddish and yellowish hues, respectively. These color values are crucial for consumer appeal, as they contribute to the visual attractiveness of the product (Mishra, n.d.).

Gluten Analysis

Gluten, the protein network in wheat dough, imparts elasticity and structure to baked goods. Gluten analysis conducted by washing the dough under tap water revealed that churros contain 53.95% gluten, a typical level for wheat-based products that require elasticity for their texture (Gómez & Valero, 2015).

DISCUSSION

Churros, A prevalent fried dough pastry, are typically produced with wheat flour, offering a chance to improve their nutritional profile by adding other grains like semolina and oats. To create WOS churros, a blend of wheat, oats, and semolina is going to be used. Their nutritional makeup and sensory qualities will be compared to those of typical wheat-based churros. To get the right texture and sensory qualities, the ratios of wheat, oats, and semolina were changed in the churro formulations. Because the composite churros included oats and semolina, the nutritional study showed that they had higher quantities of dietary fiber, protein, and micronutrients than standard churros. Utilizing their improved nutritional profile and sensory appeal, wheat-oat-semolina churros provide a tasty and nutritious substitute for classic churros. Combining wheat, oats, and semolina to make churros is a viable way to enhance the nutritional value and flavor profile of this popular treat while satisfying customer demands for more sustainable production methods and healthier food options.

CONCLUSION

Churros are pastry-like fried dough that is served and consumed with hot chocolate. It is usually made from wheat flour but in this research, in place of wheat flour, oat, and semolina are used which not only increases its benefits but also gives it enhanced flavor. The churros made from oat flour were accepted and liked by panelists and it was a successful attempt to add oat and semolina in place of wheat. The overall acceptability of our product was 8.0 which is a good level according to the hedonic scale.

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