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Sensory evaluation of low-fat potato chips using a microwave

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Abstract
This study investigates the development of low-fat potato chips using alternative processing techniques, with a focus on microwave-assisted drying as a substitute for conventional deep-fat frying. Traditional potato chips are characterized by high oil content, which negatively impacts health and shelf stability. Therefore, an attempt was made to produce potato chips with reduced fat content while maintaining desirable sensory attributes. Fresh potato slices were pre-treated through washing and controlled soaking to remove surface starch and regulate moisture. The samples were then subjected to microwave processing at 180°C for 5-7 minutes under controlled conditions. Sensory evaluation was conducted using a consumer panel and a 9-point hedonic rating scale to assess attributes such as taste, texture, and overall acceptability. The results indicated that microwave processing significantly reduced drying time and eliminated the need for added oil, leading to lower fat content compared to conventionally fried chips. Higher microwave power levels improved crispness and reduced moisture more effectively, though excessive power could slightly affect color uniformity. Overall, the findings demonstrate that microwave processing is an efficient and promising technique for producing healthier potato chips with reduced fat content, acceptable sensory quality, and improved shelf life. This approach offers potential applications in the snack food industry for developing low-fat, consumer-acceptable products.

Keywords: Low-fat snacks, microwave processing, sensory evaluation, 9-point hedonic scale, consumer acceptability

Introduction

Potato chips are among the most widely consumed snack foods across the world due to their crisp texture, pleasant flavor, convenience, and affordability. The product is prepared by slicing potatoes into thin pieces followed by frying or baking until a desirable golden color and crispness are achieved. Over the years, potato chips have become an important segment of the food processing industry, contributing significantly to the snack market and consumer food preferences.

Potato (Solanum tuberosum L.) is one of the major tuber crops cultivated worldwide and serves as an excellent raw material for snack production because of its high starch content, desirable texture, and nutritional value. Potatoes contain carbohydrates, small amounts of proteins, vitamins such as vitamin C and B-complex vitamins, and minerals including potassium and phosphorus. The quality of potato chips is greatly influenced by the chemical composition of the potato tuber, particularly starch, reducing sugars, moisture content, and dry matter. High dry matter and starch content generally produce chips with better texture, lower oil absorption, and improved crispness.

The manufacturing of potato chips involves several processing steps including sorting, washing, peeling, slicing, steeping, microwave processing, and seasoning. Each processing stage plays a crucial role in determining the quality of the final product. Improper processing conditions may lead to defects such as excessive browning, poor texture, and loss of flavor. Browning in potato chips mainly occurs due to the Maillard reaction affecting both appearance and acceptability.

Consumer demand for healthier and high-quality snack products has encouraged researchers and food industries to explore improved processing techniques, alternative frying methods, flavor innovations, and quality control measures. Sensory characteristics such as color, taste, aroma, crispness, and overall acceptability are important factors influencing consumer preference for potato chips. In addition, shelf life, packaging materials, and storage conditions are also essential considerations in maintaining product quality and safety.

This focuses on the production, quality evaluation, and sensory characteristics of potato chips. The study aims to analyze the sensory properties of the final product. The findings of this research may contribute to the development of improved potato chip products with enhanced quality, nutritional value, and consumer acceptability.

The Research Included four Samples with Different Flavors

1. **Sample 1:** Fried rice masala chips
2. **Sample 2:** Chaat masala chips
3. **Sample 3:** Salt and spices (chili powder) chips
4. **Sample 4:** Maggi masala chips

Objectives of the Study

1. To prepare low-fat potato chips using microwave-assisted processing technology.
2. To standardize the processing conditions such as slice thickness, soaking time, microwave power, and heating duration for optimum quality potato chips.
3. To reduce the oil content of potato chips in comparison to conventional deep-fat fried chips.
4. To conduct sensory evaluation of microwave-prepared potato chips based on appearance, flavor, taste, crispness, texture, and overall acceptability.
5. To study the feasibility of microwave processing as a healthier alternative method for potato chip production.

Instruments and Ingredients
Instruments
1. Microwave
2. Peelers/peeling machine
3. Slicers/slicing machine, knife

Ingredients
1. Potatoes (Medium and small size)
2. Salt
3. Water
4. Edible oil (Refined oil)
5. Spices: Chaat masala, fried rice masala, maggi masala, chilli powder, salt

Methodology
1. Selection of raw material
Fresh, mature and defect free potatoes were selected for the experiment

2. Washing and peeling
Potatoes were washed thoroughly under running water and peeled manually

3. Slicing
Potatoes were sliced uniformly into thin slices of approximately 0.6 mm or 0.06 cm thickness using the slicer.

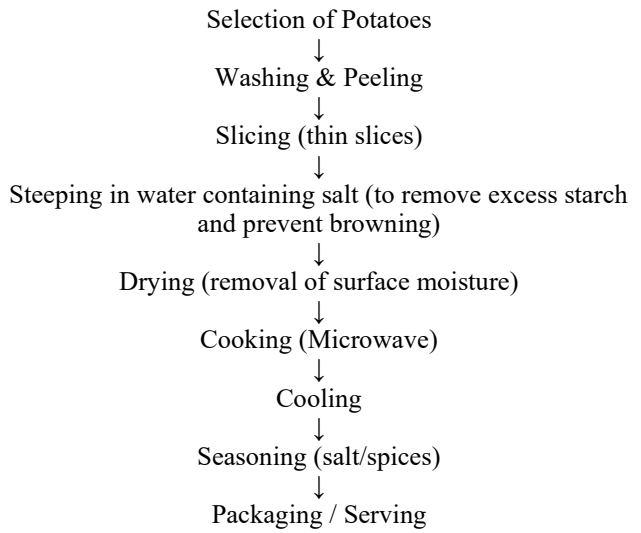
4. Steeping
Slices were steeped in cold water containing a small amount of salt approximately 10 grams for 2-3 minutes to reduce enzymatic browning, excess starch and microbes.

5. Drying
Slices were dried using muslin cloth and coarse filter paper to remove surface moisture

6. Novel drying technique - microwave drying
Microwave heating in combination with hot air circulation is used for drying. Microwaves are primarily used for moving water from the wet interior of potato slices to the surface, relying on preferential heating of microwaves.
It was found that at 180° C for 5-7 minutes of processing, the potato chips gained the crispiness that of the commercial fried chips.

7. Seasoning
Salt and spices were sprinkled uniformly after microwave treatment.

Preparation Flow Chart



Main Takeaways
Why is the microwave used? We can make chips with little or no oil. Chips are much lower in fat compared to deep-fried chips. Chips get ready in just 5–10 minutes. There's no need to heat oil or wait long. No oil splashing or frying smell. Minimal utensils are used and easy cleanup. Chips turn crispy but not greasy. Chips feel lighter and easier to digest.
What actually is happening? As the temperature rises, water inside converts into steam. Steam creates pressure inside the potato cells this pushes moisture outward. Water escapes as vapor and moisture content decreases. Thin slices lose water quickly and become dry and stiff. This is essentially dehydration plus slight cooking.
What happens to the microbial content? Microorganisms need water (moisture) to survive and multiply. Microwave chips lose water quickly this leads to low water activity. This makes the environment unfavorable for microbial growth. As the potato heats up, temperatures can reach 60–100°C or more. Most bacteria and molds are heat-sensitive, so they get destroyed. This is like pasteurization (but less controlled).
Is microwave heating a better option? Yes, microwave heating is a better option for chips and simple cooking when we want healthier food, quick preparation, less oil, and turmoil.

Organoleptic Evaluation of the Product
The Organoleptic Evaluation of the product was conducted to assess the consumers' acceptance of the product. For this, a panel of 100 untrained panelists was set up to evaluate different samples of potato chips containing different flavors.
Panelists were selected randomly with care to accommodate different sections, age groups, and genders. Different parameters used were color. Flavor, texture, Taste and overall acceptability.
Fresh water was provided to rinse their mouths. They were asked to evaluate the product in respect of the above parameters and to record their preferences.

Data Analysis and Interpretation Based on Questionnaire Responses
Section A: Pre-Testing

Total Number of Respondents=100
1. Do you like chips?

Particulars	No of Respondents (100)	Percentage
Yes	96	96%
No	4	4%

Interpretation: Many consumers like chips.

2. Which brand do you like the most?

Particulars	No of respondents	Percentage
Lays	73	73%
Uncle Chips	17	17%
Too yummy	5	5%
Bingo	5	5%

Interpretation: Most of the consumers like lays brand and the least liked brands are too yum and bingo.

3. What kind of chips do you like?

Particulars	No of Respondents (100)	Percentage
Fried	78	78%
Baked	22	22%

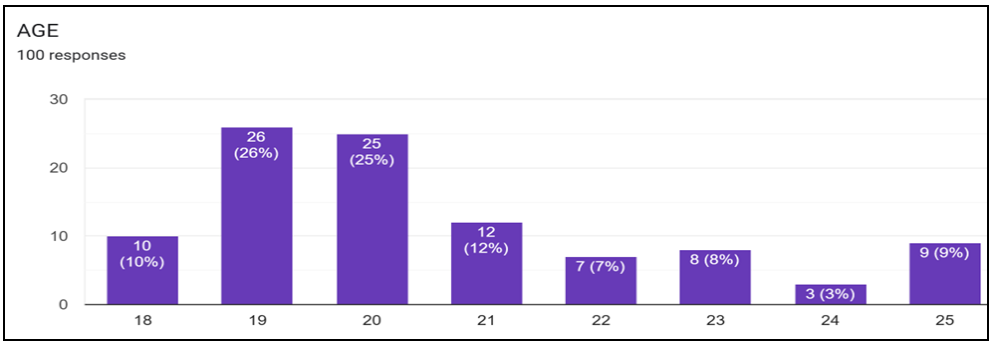
Interpretation: Fried chips are liked by most consumers while baked chips are not liked that much.

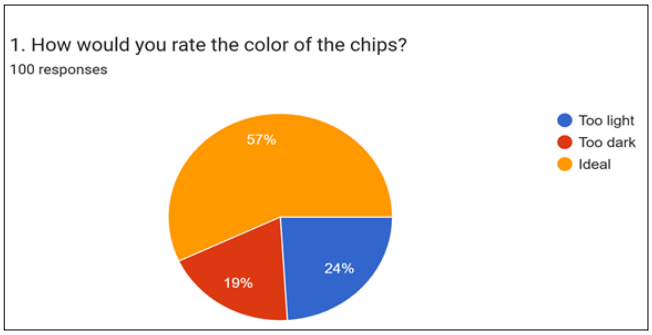
Hedonic Scale

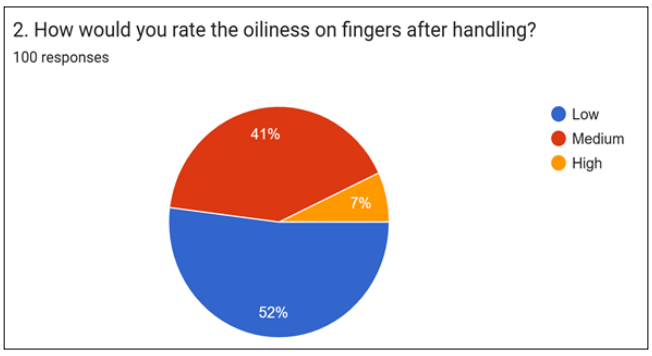
Scoring/rating	Hedonic scale
9	like extremely
8	like very much
7	like moderately
6	like slightly
5	neither like nor dislike
4	dislike slightly
3	dislike moderately
2	dislike very much
1	dislike extremely

Section B: Post Testing

Total Number of Panelist = 100







Why this Product is Better

1. Shelf life - The potato chips are prepared with very little usage of oil which helps in increasing its shelf life. The shelf life of microwave processes chips is higher as compared to the fried chips.
2. More healthy - the fried chips contain more oil than baked chips; therefore, the product is preferable among the consumers who are health conscious. The product also does not cause cholesterol problems and heart diseases, etc.

Conclusion

The present study successfully demonstrated the preparation of low-fat potato chips using microwave-assisted processing and the sensory evaluation of these potato chips. The research focused on reducing the oil content of potato chips while maintaining desirable sensory and quality characteristics. Different pre-treatment methods such as washing, soaking, and controlled drying were applied to improve texture, colour, crispness, and overall acceptability of the final product.

The findings of the study revealed that microwave processing significantly reduced fat absorption in comparison to traditionally fried potato chips. The developed chips possessed acceptable sensory qualities including appearance, flavour, texture, crispness, and taste, indicating that microwave technology can effectively produce healthier snack products without major compromise in consumer acceptability. The controlled moisture removal during microwave heating also contributed to improved shelf stability and product quality.

The study further highlighted the importance of process standardization, including slice thickness, microwave power, and heating duration, in achieving uniform and high-quality potato chips. Sensory evaluation results indicated good acceptance among panel members, proving the feasibility of microwave-prepared potato chips as a nutritious and low-fat alternative snack.

The organoleptic evaluation demonstrated the overall acceptance of the potato chips by the panellists and further by the consumer. The sensory evaluation helped in getting idea about the overall acceptance of the product in the market, long term or short-term running of the product and the profit product will gain in the competitive market.

The sensory evaluation was done with the help of 100 untrained panellists or consumers which gave us an initial idea, whether the product will be liked or not among the wide range of consumers of different ages. It also helped in formulation of the samples containing different Flavors and spices and knowing which sample was most acceptable and whether the samples need any further improvement based on different attributes like taste, flavours, aroma. The

sensory evaluation thus is required to make the product acceptable among consumers so that if the product is to be launched in the market it can gain high profit and increase brand loyalty.

References

1. University of Agricultural Sciences Bengaluru. Consumer Preference for Potato Based Products: A Study in Bengaluru Metropolitan. Anitha.
2. Mosabbeb A, *et al*. A Systematic Review of the Factors Affecting the Rheological and Sensory Properties of Potato Chips. Journal of Texture Studies, 2026.
3. Potato Chip Varietal Analysis: A Comparative Evaluation Based on Potato Cultivars. European Potato Journal,2023:67(3):1-16.
4. Hui YH, Sherkat F. Handbook of Food Science, Technology, and Engineering. CRC Press, 2005.
5. Mancuso JJ, Capossela AC. Process for preparing low fat potato chips. General Foods Corporation, 1968.
6. Joshi A, Rudra SG, Sagar VR, Raigond P, Dutt S, Singh B, *et al*. Development of low-fat potato chips through microwave processing, 2016.
7. Borgstrom G. Principle of Food Science. Vol. 2. 1968.
8. Ramaswamy H, Marcotte M. Food Processing: Principles and Applications, 2005.
9. ScienceDirect. Available from: https://sciencedirect.com