



FORMULATION AND DEVELOPMENT OF FROZEN FISH NUGGETS INCORPORATED WITH LEMON GRASS(CYMBOPOGON) AND ROSEMARY(ROSMARIUS)

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Abstract: The nuggets which is available on the market are known with many health effects due to addition of improper preservatives added on to it. This study and the development of the product ensures that no chemically preservatives is added on to it and as well ensures that this development of the product is highly nutritious and safe for consumption. The two mainly incorporated stem(**lemon grass**) and herb(**rosemary**) in combination with basa fish which has been used for the development of the product compute to be an excellent source of nutrients and also adds up an additional flavouring to the product which compared to the other nuggets which is avail these days.

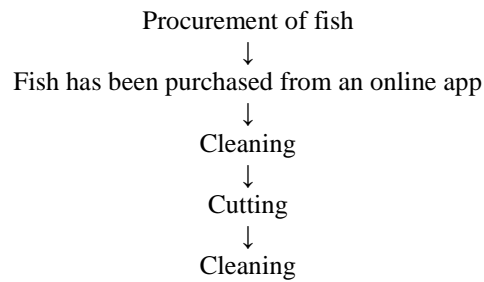
Index Terms – **Fish nuggets, Lemon grass, Rosemary, Basa**

I. INTRODUCTION

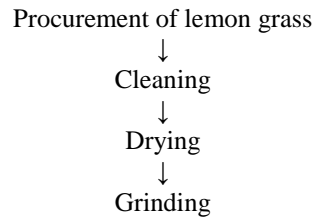
Fish nuggets in which it means that pieces of fish flesh (not minced) formed into small irregular shapes. May be formed from fillets, fillet pieces, or fish blocks. Breaded and fried, or raw breaded. In batters, the main role of the outer crust formed during the pre-frying or cooking of this kind of food is to act as a barrier against moisture loss, protecting the natural juices of the food substrates during freezing or reheating. Final cooking of battered food leads to a product that is tender and juicy on the inside and crisp on the outside. This particular texture is easily obtained by deep frying (DF), which is the most common final cooking method.

II. METHODOLOGY

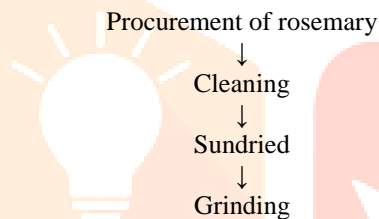
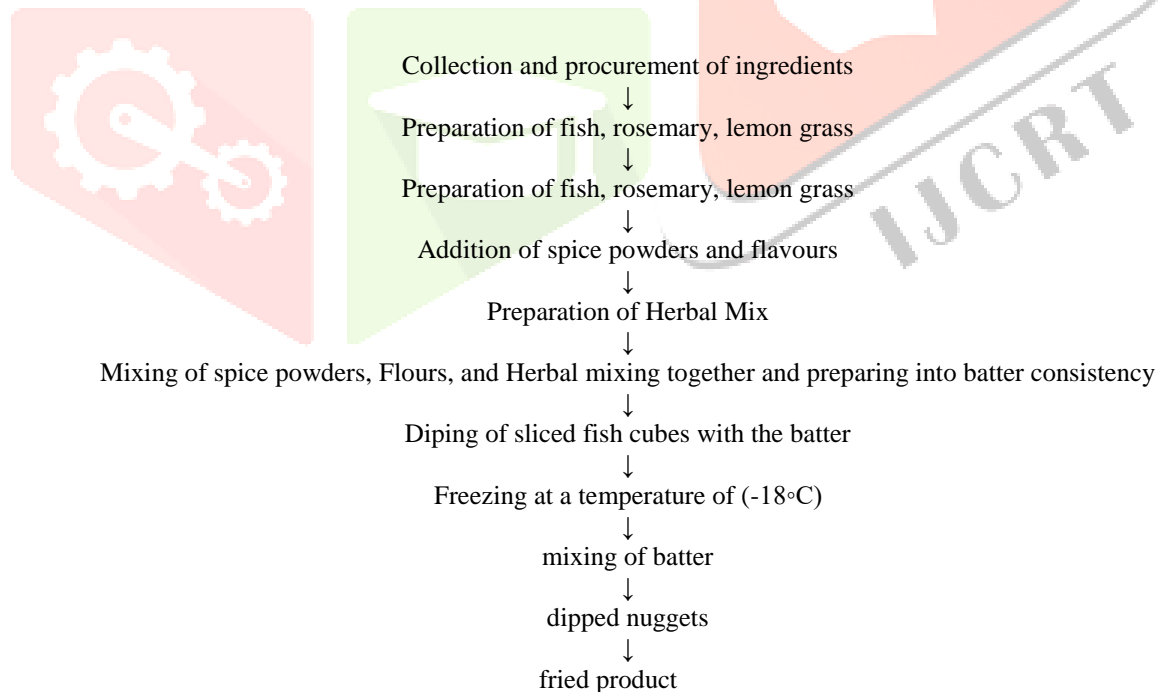
Selection and collection of raw material was done from the super market.

Procurement of Raw materials:**Processing of fish****Processing of lemon grass**

The procured lemon grass is bought and then sundried. The sundried lemongrass is then grinded into fine particles.

**Processing of Rosemary:**

The rosemary is been cleaned and sundried and then grinded into fine particles.

**Preparation of fish nuggets:**

III. FIGURES AND TABLES

TABLE 1: STANDARDIZATION OF FISH NUGGETS

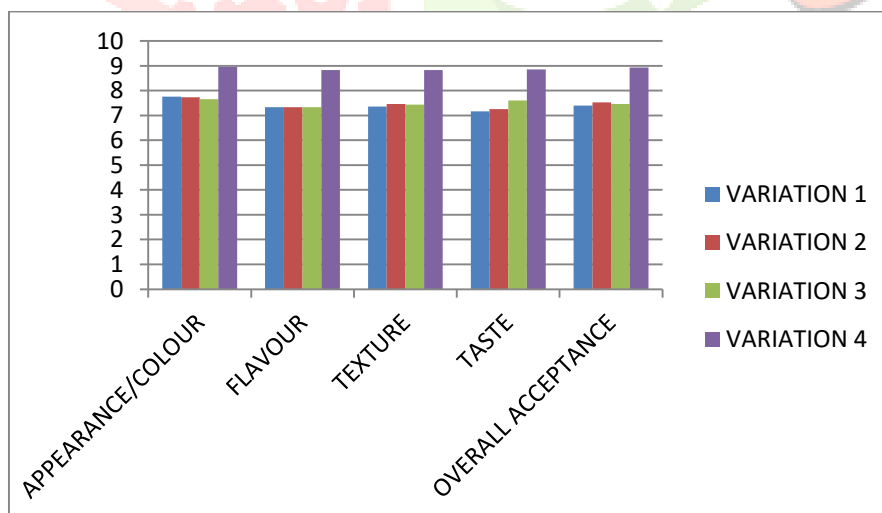
INGREDIENTS	VARIATION 1	VARIATION 2	VARIATION 3	VARIATION 4
BASA FISH	40g	40g	40g	40g
MAIDA	30g	30g	30g	30g
CORN FLOUR	10g	10g	10g	10g
LEMONGRASS	6g	8g	8g	7g
ROSEMARY	6g	8g	6g	7g
MUSTARD PASTE	8g	4g	6g	6g

TABLE 1: The standardization of the fish nuggets is done under four variations.

TABLE 2: ORGANOLEPTIC EVALUATION OF FISH NUGGETS

CRITERIA	CONTROL	VARIATION - I	VARIATION - II	VARIATION - III	VARIATION - IV
APPEARANCE/COLOUR	8.73±0.44	7.76±0.72	7.73±0.78	7.66±0.60	8.96±0.18
FLAVOUR	8.76±0.50	7.33±0.80	7.33±0.84	7.33±0.75	8.83±0.37
TEXTURE	8.6±0.62	7.36±0.88	7.46±0.73	7.43±0.77	8.83±0.37
TASTE	8.63±0.55	7.16±0.83	7.26±0.69	7.6±0.67	8.86±0.34
OVERALL ACCEPTANCE	8.75±0.56	7.4±0.62	7.53±0.57	7.46±0.68	8.93±0.25

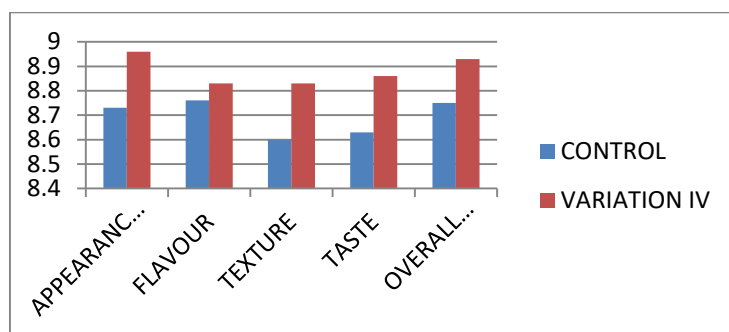
FIGURE 1: FIGURE OF ORGANOLEPTIC EVALUATION OF FISH NUGGETS



The developed fish nuggets, sample 1, 2, 3, and 4 were evaluated 30 panel members. The products were evaluated based on the preference on appearance/colour, flavour, texture, taste, and overall acceptability using likeability scale. The table indicates the average sensory score of the formulated fish nuggets. Among the four variations, the IV variation was highly accepted in all sensory characteristics.

TABLE 3: MEAN SENSORY SCORE OF CONTROL AND FORMULATED FISH NUGGETS

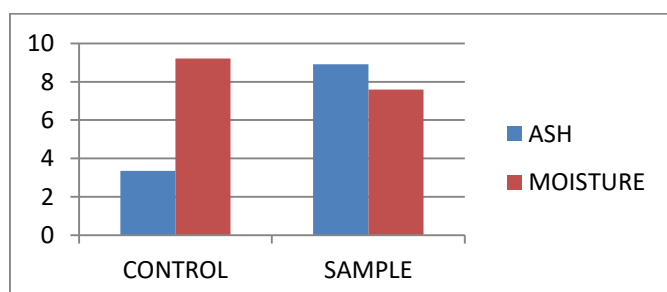
	CONTROL	VARIATION IV
APPEARANCE/COLOUR	8.73±0.44	8.96±0.18
FLAVOUR	8.76±0.50	8.83±0.37
TEXTURE	8.6±0.62	8.83±0.37
TASTE	8.63±0.55	8.86±0.34
OVERALL ACCEPTANCE	8.75±0.56	8.93±0.25

FIGURE 2: FIGURE OF MEAN SENSORY SCORE OF CONTROL AND FORMULATED FISH NUGGETS

From the above table, it is clear that the formulated fish nuggets has better score than control and based on organoleptic evaluation the variation IV has been used for the further analysis.

TABLE 4: PHYSIO-CHEMICAL ANALYSIS OF FISH NUGGETS

Criteria	Control	Sample
ASH	3.35	8.91
MOISTURE	9.22	7.6

FIGURE 3: FIGURE OF PHYSIO-CHEMICAL ANALYSIS OF FISH NUGGETS

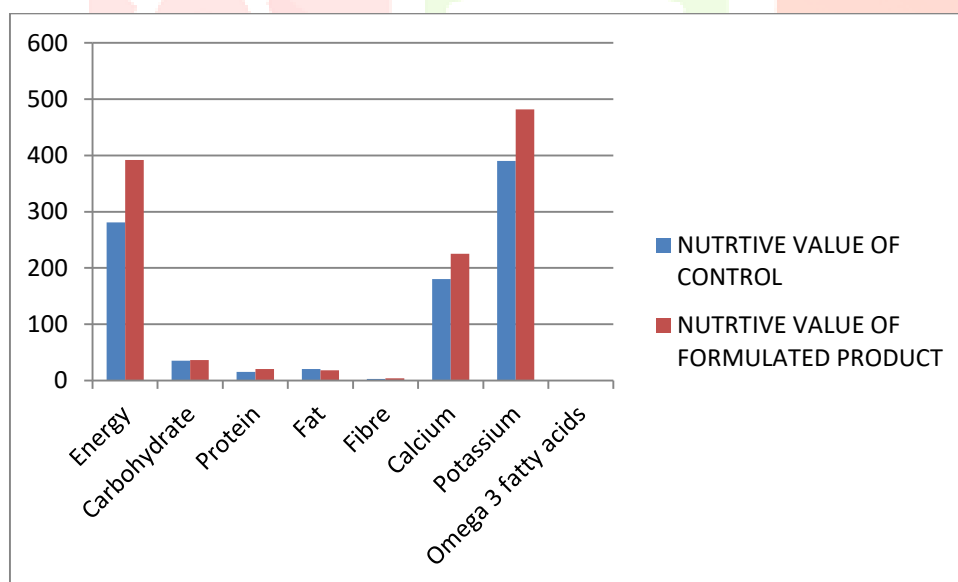
The experimental Fish Nuggets (Variation IV) has got the higher score of ash value when compared with control. The ash content of the control and sample was (3.35 & 8.91). The moisture content of sample was lesser than control, lower the moisture content helps to minimize the growth of microorganism and food spoilage. The moisture content of the control and sample was (9.22 & 7.6) respectively.

TABLE 5: NUTRITIONAL ANALYSIS OF FISH NUGGETS

CONTROL AND SELECTED VARIATION

S.NO	PARAMETERS	NUTRITIVE VALUE OF CONTROL	NUTRITIVE VALUE OF FORMULATED PRODUCT
1	Energy (Kcal)	280.7	391.7
2	Carbohydrate (g)	35.3	36.39
3	Protein (g)	15.1	20.1
4	Fat (g)	20.3	18.3
5	Fibre (g)	2.8	3.82
6	Calcium (mg)	180	225
7	Potassium (mg)	390	482
8	Omega 3 fatty acids (mg)	0.009	0.013

FIGURE 4: NUTRIENT ANALYSIS OF FISH NUGGETS



From the graph the formulated product has secured high score than the control.

TABLE 6: COST CALCULATION OF FISH NUGGETS

S. No	INGREDIENTS	COST OF INGREDIENTS per(kg)(rupees)	VARIATION 4(g)	COST (rupees)
1	Basa fish	500	40	20
2	Maida	30	30	1.2
3	Corn flour	30	10	0.4
4	Lemongrass	60	5	0.2
5	Rosemary	60	4	0.16
6	Mustard paste	65	2	0.08

- Raw material count = 22
- Overhead charges(40%) = 12
- Processing & packaging = 30
- Total cost = 64/-

The price for 100g of the formulated fish nuggets 64 /- including all the overhead charges.

IV. DISCUSSION

Fish nuggets or fish sticks are a processed food made using a whitefish, such as cod, hake, haddock or pollock, which has been battered or breaded. They are commonly available in the frozen food section of supermarkets. They can be baked in an oven, grilled, shallow fried, or deep-fried. The fish which is used to make the nuggets is Basa Fish or Asian catfish (Pangasius bocourti) is a freshwater fish in the family Pangasiidae found in Southeast Asia, especially in the Mekong and Chao Phraya Rivers.

The formulated fish nuggets in which it is rich in all essential nutrients especially rich in protein, and omega 3 fatty acids, in which it has unique taste properties and also the herb rosemary and the stem lemongrass which is been incorporated in which rosemary is a rich source of antioxidants and anti-inflammatory compounds, which are thought to help boost the immune system and improve blood circulation. Rosemary is considered a cognitive stimulant and can help improve memory performance and quality.

Based on all the aspects, the present study is intended to develop a healthy fish nuggets by incorporating lemongrass and rosemary to enhance the digestibility and absorption into formulated product and it can reduce the risk of protein malnutrition and also help to prevent nutrition deficiency disorders.

CONCLUSION

In present scenario, one needs to emphasize on the consumption of locally available and cost effective sources which could enhance the nutritional potential of traditional recipe. In this study, intend to develop a healthy nutritious fish nuggets by incorporating lemon grass and rosemary in which it is a protein enriched product in which it's consumption helps to prevent protein malnutrition.

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