



Processing Technique Affects Shelf life and Sensorial Quality of Fish Pickle

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ABSTRACT

The main aim of the study was to prepare organoleptic accepted fish pickle by using preservatives like vinegar, sodium benzoate, salt at different ratios and study shelf life for a period of 180d by observing changes in colour, flavor, texture and appearance of fungus. The results showed that fish pickle stored successfully for 180 d at ambient temperature ($26 \pm 4^\circ \text{C}$) without any significant change in the quality attribute after incorporation of vinegar and sodium benzoate as a common preservative. Therefore, the preservation of fish pickle by making use of vinegar and sodium benzoate was the best method for extending the shelf life and to retard the growth of microbial load. It was also found that vinegar cured fried fish blanched +8per cent salt + spice+35per cent mustard oil 0.1% sodium benzoate and store in sterilized glass bottle got highest sensorial score in terms of colour, flavour, texture, taste, appearance and overall acceptability than other four treatments.

Key Words: Fish, Preservatives, Microbial, Sensory, Shelf life.

INTRODUCTION

Fish is an excellent and cheapest source of high-quality protein which contains essential amino acid, lipid, long chain n-3 unsaturated fatty acid, which is very important for the normal functioning of nervous system and blood clotting of human body. Fish is highly perishable, having shorter shelf life, spoilage commences immediately after harvesting and a vast array of biochemical and physiological changes take place from the time fish is killed until it is consumed. Post-harvest losses of fish due to spoilage can be reduced to a great extent through proper processing and preservation in the form of pickle.

Pickle is a good appetizer consumed by all age of people which contain large number of lactobacilli bacteria which are important for the digestion of grains and vegetables which have usual beneficial probiotics properties used by the body. (Shahzor *et al*, 2015). For pickling proper concentration of

salt is very important for better shelf life and also to reduce the infestation of mold, yeast and bacteria. If salt concentration is less, the product gets slimy, soft and holds lots of water. Therefore, the average salt concentration should not be less than 5.3%. (Rajablou *et al*, 2012).

Texture is also one of the most important sensorial quantitative characteristics of pickle (Sadeghizadeh *et al*, 2018). The process of pickle production is carried out under optimal condition, some changes occur in the texture of primary products which affects the quality of pickle (Rodrigo and Alvarruiz, 1988). Mustard oil, salt, and vinegar are the common preservative used for long time back (Devi, 2018). The popular common pickle prepared by the women entrepreneurs are mango, mixed vegetable, garlic, wild apple, hog plum, fish and chicken pickle but the quality and shelf life of these pickles are of question. The problem of shelf life of fish pickle is higher in Manipur, and hence

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Table 1. Method of selection of sample with different treatment.

Sample	Treatment
Sample - 1	Fried fish +3.5 per cent salt + spice + 15per cent mustard oil and store in sterialised glass bottle
Sample - 2	Fried fish + 5per cent salt + spice + 20per cent mustard oil and store in sterialised glass bottle
Sample – 3	Fried fish + 6per cent salt + spice + 25per cent mustard oil and store in sterialised glass bottle
Sample – 4	Fried fish + 7per cent salt + spice + 30 per cent mustard oil +0.1% sodium benzoate and store in sterialised glass bottle
Sample - 5	Vinegar cured fried fish blanched +8per cent salt + spice+35per cent mustard oil 0.1% sodium benzoate and store in serialised glass bottle

an attempt is made to minimize the spoilage by the proper use of technology and also to select good quality fish. The present study was undertaken to prepare fish pickle by use of different technologies in order to see the fungal growth at different storage period and also to assess the quality and overall acceptability of fish pickle by sensory evaluation.

MATERIALS AND METHODS

The fresh, healthy rohu fish were collected from Imphal market and other ingredients like spices, oil and vinegar were also collected from the local market. The experiment was conducted for a period of six months. Observation was recorded at the interval of 15 days for the period of 2months and at the interval of 30 days for the period up to six months in order to see any change in colour, flavor, texture and appearance of fungus. To determine the consumer preference and acceptability of the product, sensory evaluation was carried out by using 9-point Hedonic scale. Thirty semi- trained panelists of the aged 30-40 years familiar with the sample, working as women entrepreneurs of Imphal, Manipur. Method of collection of samples along with different treatments is given in Table 1.

Method of Preparation of Fish Pickle

The recipe of the fish pickle is given in Table 2. Select healthy fish, remove head, scale, fin and gut content of fish and wash thoroughly. Cut the

fish meat in to small cubes. Mix the fish thoroughly with 3% salt and keep for two hours. Fry the fish in minimum quantity of oil and keep separately. Fry mustard seed, green chilli, garlic and ginger paste in the remaining oil till it cooks properly. Add chilli powder, pepper and turmeric powder and mix well over low flame for a few minutes. Then add fried fish and cook for few minutes, then add salt, garam masala powder and mix well. When cooled, fill in the sterilized bottles and seal properly. In some treatment like T_4 sodium benzoate was added after removing from fire. In case of T_5 fried fish was cured in vinegar for 12 hr and other process remain the same with T_4 .

Results and discussion

The fungal growth developed in fish pickle at different storage period was examined through visual observation. Details of the observation were given in Table 3. Up to 10 days storage, no fungal growth was observed. During 15 days of storage, the fungal growth was observed in T_1 due to low concentration of salt and mustard oil. Whitish fungal growth was observed on the surface of the pickle may be due to spices, other ingredients, from the air or from lid of the jar. From 30 days, severely growth was observed. From 45 days to 180 days, excessive growth of fungus was observed in case of T_1 and in case of T_2 excessive growth of fungus was observed from 90 days to 180 days and other treatments like T_3 there was slight

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Table 2. Recipe of Fish Pickle.

Ingredient	Treatment				
	T1	T2	T3	T4	T5
Fried fish (kg)	1	1	1	1	1
Mustard Oil (ml)	150	200	250	300	350
Salt (g)	35	50	60	70	80
Chilli Powder (g)	20	30	35	40	50
Jira Powder(g)	5	10	15	20	20
White Mustard Seed Powder(g)	10	20	20	20	20
Garam masala powder (g)	5	10	10	10	10
Fenugreek powder(g)	5	10	10	10	10
Coriander powder(g)	5	10	10	10	10
Turmeric Powder (g)	10	10	10	10	10
Garlic paste (g)	-	50	100	150	150
Ginger paste(g)	-	30	50	70	100
Green chilli paste(g)	-	20	50	50	50
Vinegar	-	-	-	100 ml	1 lt
Sodium benzoate	-	-	-	1.0g	1.0g

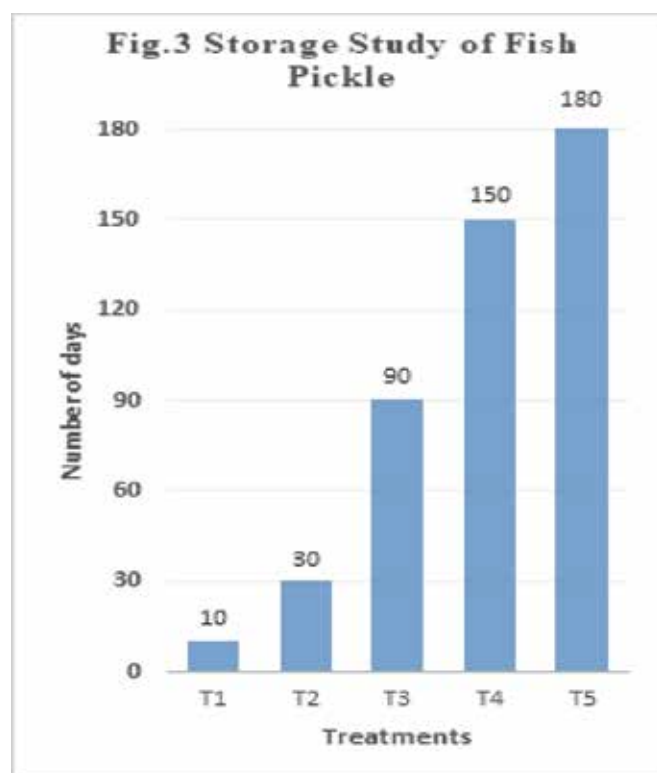


Fig 1: Flow Chart for the Preparation of Fish Pickle

growth by fungus. In treatment like T₄ fungal growth started from 150 days and for T₅, there was no fungal appearance on the surface of the pickle up to 180 days due to high concentration of salt, mustard oil, sodium benzoate and vinegar. The covering of oil as well as proper concentration of salt helped to prevent microbial contamination and vinegar also helped to maintain the proper *pH* of the pickle.

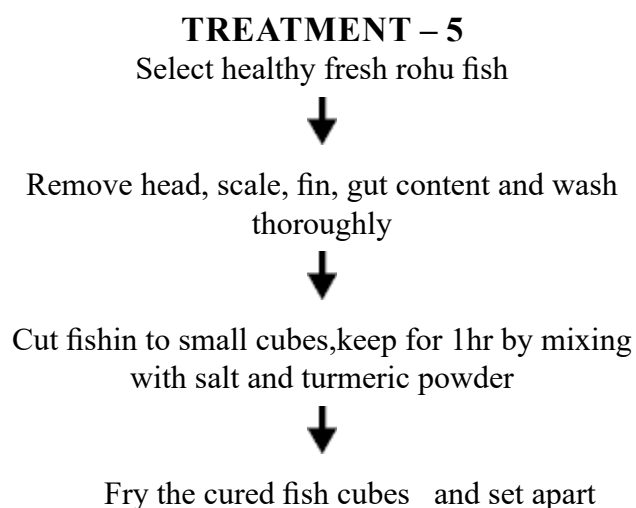


Table 3. Sensory Attributes of Fish pickle.

Sample Code	Colour	Flavour	Taste	Appearance	Overall Acceptability
S1	6.2 ± 0.41	6.8 ± 0.44	6.7 ± 0.47	6.9 ± 0.36	6.8 ± 0.41
S2	7.0 ± 0.42	6.8 ± 0.41	7.0 ± 0.39	7.0 ± 0.22	7.0 ± 0.24
S3	7.1 ± 0.44	6.9 ± 0.31	7.0 ± 0.39	7.0 ± 0.38	7.1 ± 0.31
S4	7.4 ± 0.48	7.2 ± 0.36	7.5 ± 0.51	7.0 ± 0.52	7.6 ± 0.58
S5	8.0 ± 0.24	7.7 ± 0.47	8.0 ± 0.46	80.1 ± 0.24	8.2 ± 0.36

Soak the fried fish in vinegar for 12 hrs and drain the vinegar water



Fry garlic, ginger and chilli paste in oil till characteristic smell and colour appear



Add vinegar cured fish, spices, salt and fry for few mins



Remove from fire, add sodium benzoate and cool properly



Fill in sterilized jar



Add mustard oil to make a layer of oil on the top surface of pickle



Seal and store in cool dry place

flavour and texture started from 45d onwards (Table 4). This may be due to lack of proper concentration of preservatives like salt and mustard oil. In case of T₃, changes started from 60 d onwards and for T₄, changes started from 150d onwards due to lack of right concentration of preservatives like vinegar and sodium benzoate. For T₅, there was no change in color, flavour and texture up to 180d as the fried fish was cured in vinegar for 12 hr and right concentration of salt and mustard oil were added which helped to extend the shelf life up to 180d.

Sensory Evaluation of Fish Pickle

The consumer's acceptability of processed fish pickle was evaluated by a taste testing panel. The hedonic rating test was used to determine the acceptability of pickle. The 30 panelists were selected from women entrepreneur of Imphal, Manipur. Panelists were asked to give scores for characteristic color, flavour, texture, taste and overall acceptability of the processed fish pickle. The scale was arranged such that 9 = like extremely, 8 = like very much, 7 = like moderately, 6 = like slightly, 5 = neither like or dislike, 4 = Dislike slightly, 3 = Dislike moderately, 2 = Dislike very much, 1 = Dislike extremely. The mean score and SD of performance of fish pickles were presented in Table 3. It was seen that T₅ secured the highest score: 8.0 ± 0.24 for colour, 7.7 ± 0.47 for flavour, 8.0 ± 0.46 for texture, 80.1 ± 0.24 for taste, 80.1 ± 0.24 and 8.2 ± 0.36 for appearance and overall acceptability and was ranked 8 (like very much). It also showed that T₁ got the lowest value than the other sample. So, this indicated that color, flavour, texture, taste and appearance of T₅ is more acceptable than other four treatment.

Storage Studies of Fish Pickle

Fish pickles were stored at room temperature. The deterioration of the product was observed at a regular interval of 15d upto 60d and 30d interval for a period up to 180d. The change in color, flavour and texture were observed for a period of 180 d. Five different sample fish pickles were used for storage studies at room temperature of 26^o – 30^o C from 15 d to 180d. The processed fish pickles were in good condition up to 10d in case of T₁ and in case of T₅, it was up to 180d. For T₁ change in colour started from 15d onwards and in case of T₂, change in color,

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Table 4. Visual Observation of Fungus Growth Developed in Fish Pickle at Different Storage Period

Storage Period (Days)	Sample	Fungal Growth
15	S1	Slightly Growth
	S2	No Growth
	S3	No Growth
	S4	No Growth
	S5	No Growth
30	S1	Severely Growth
	S2	Slightly Growth
	S3	No Growth
	S4	No Growth
	S5	No Growth
45	S1	Excessive Growth
	S2	Severely Growth
	S3	No Growth
	S4	No Growth
	S5	No Growth
60	S1	Excessive Growth
	S2	Severely Growth
	S3	No Growth
	S4	No Growth
	S5	No Growth
90	S1	Excessive Growth
	S2	Excessive Growth
	S3	Slightly Growth
	S4	No Growth
	S5	No Growth
120	S1	Excessive Growth
	S2	Excessive Growth
	S3	Severely growth
	S4	No Growth
	S5	No Growth

Storage Period (Days)	Sample	Fungal Growth
150	S1	Excessive Growth
	S2	Excessive Growth
	S3	Severely Growth
	S4	No Growth
	S5	No Growth
180	S1	Excessive Growth
	S2	Excessive Growth
	S3	Excessive Growth
	S4	Slightly Growth
	S5	No Growth

Table 5. Visual Observation Of Change Developed In Fish Pickle At Different Storage Period

Shelf life (Days)	Sample	Colour	Flavour	Texture	Remark
15	S1	Slightly Change	No off flavour	Firm	Good
	S2	No Change	No off flavour	Firm	Good
	S3	No Change	No off flavour	Firm	Good
	S4	No Change	No off flavour	Firm	Good
	S5	No Change	No off flavour	Firm	Good
30	S1	Change	Slightly off flavour	Slightly Soft	Fair
	S2	Slightly Change	No off flavour	Firm	Good
	S3	No Change	No off flavour	Firm	Good
	S4	No Change	No off flavour	Firm	Good
	S5	No Change	No off flavour	Firm	Good
45	S1	Change	Off flavour	Soft	Slightly spoiled
	S2	Change	Slightly off Flavour	Slightly soft	Fair
	S3	No Change	No off flavour	Firm	Good
	S4	No Change	No off flavour	Firm	Good
	S5	No Change	No off flavour	Firm	Good
60	S1	Change	Off flavour	Extremely soft	Spoiled
	S2	Change	Off flavour	soft	Slightly spoiled
	S3	Slightly Change	Slightly off Flavour	Slightly soft	fair
	S4	No Change	No off flavour	Firm	Good
	S5	No Change	No off flavour	Firm	Good

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Shelf life (Days)	Sample	Colour	Flavour	Texture	Remark
90	S1	Change	Off flavour	Extremely soft	Completely spoiled
	S2	Change	Off flavour	Extremely soft	Spoiled
	S3	Change	Off flavour	soft	Slightly spoiled
	S4	No Change	No off flavour	Firm	Good
	S5	No Change	No off flavour	Firm	Good
120	S1	Change	Off flavour	Extremely soft	Completely spoiled
	S2	Change	Off flavour	Extremely soft	Spoiled
	S3	Change	Off flavour	Extremely soft	Spoiled
	S4	Slight Change	Slight off flavour	Soft	Slightly spoiled
	S5	No Change	No off flavour	Firm	Good
150	S1	Change	off flavour	Extremely soft	Completely spoiled
	S2	Change	off flavour	Extremely soft	Completely spoiled
	S3	Change	off flavour	Extremely soft	Spoiled
	S4	Change	off flavour	Soft	Slightly spoiled
	S5	No Change	No off flavour	Firm	Good
180	S1	Change	off flavour	Extremely soft	Completely spoiled
	S2	Change	off flavour	Extremely soft	Completely spoiled
	S3	Change	off flavour	Extremely soft	Spoiled
	S4	Change	off flavour	Soft	Slightly spoiled
	S5	No Change	No off flavour	Firm	Good

CONCLUSION

Fish pickle is highly perishable so, proper preservatives like salt, mustard oil, sodium benzoate and vinegar should be used in proper concentration to extend the shelf life of the pickle. From this study, it was found that fungal growth was a great problem of pickle. If added proper concentration of preservatives, the fungal growth becomes very low. The panelists also tested the product and gave the score for color, flavour, texture, taste and overall acceptability. The score of panel test indicated that among the five treatments, the pickle which was prepared with vinegar cured fish with proper concentration of salt, mustard oil and sodium

benzoate (T_5) was the most acceptable. In case of shelf life, T_5 have better shelf life than other 4 treatment. It was proved that T_5 is the best method for extending the shelf life and also for improving the quality of the fish pickle. This study gives a good prospect on processing fish pickle. This technology may be adopted on large scale by the women entrepreneurs and farm women in order to generate income which can occupy a space in the market.

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