

## STANDARDIZATION AND FROZEN STORAGE OF FISH CUTLET FROM BLEACHED AND UNBLEACHED MACKEREL MINCEMEAT\*

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### ABSTRACT

In the present study, fish cutlets were prepared from bleached and unbleached mackerel mince meat. Fish cutlets prepared from bleached meat had scored higher values for taste, flavour and overall acceptability as compared to those from unbleached mincemeat. Fish cutlets prepared with corn flour at the rate of 15% of fish mincemeat had scored higher values for all attributes as compared to other levels. Between the bleached and unbleached mincemeat, the scores for cutlet prepared with bleached mincemeat had higher score than that for the latter. There were no cracks in cutlets prepared with 15% and above corn flour levels as compared to those with lower levels. Fish cutlets prepared from bleached and unbleached mincemeat with spice mixture at 20 and 30% of the fish mince, respectively, had higher scores for taste, flavour, texture and overall acceptability as compared to those with other levels. Organoleptic quality of cutlet prepared from bleached and unbleached mackerel mince did not show changes in the appearance, colour and texture during storage. Changes were more prominent in flavour, taste and overall acceptability. Fish cutlets prepared from bleached mincemeat were acceptable for two months and those from unbleached mincemeat were acceptable up to one month from the point of view of organoleptic and biochemical qualities.

**Key words:** Mackerel mincemeat, fish cutlet, shelf life

### INTRODUCTION

Fatty fishes such as sardine, mackerel, etc. can be used for the preparation of minced meat for export. This would require water bleaching (Chandrashekhar *et al.*, 1988; Hastings *et al.*, 1990) with sodium bicarbonate and sodium chloride (Suzuki, 1981). It has been reported that consumption of fatty fish or fish oils could

reduce cardio-vascular diseases and act as an adjuvant to drug therapy (Simopoulos, 1991). There has been an increasing pressure on food manufacturers to incorporate 'fish fatty acids' (Omega-3 polyunsaturated fatty acids) in their products due to their reported health benefits. However, water bleaching of the fatty fish mince during the production of

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surimi would remove fat and all the benefits that could be derived from this fat. Therefore, it was felt necessary to try the suitability of unbleached and bleached mackerel fish mince for the preparation of fish cutlet.

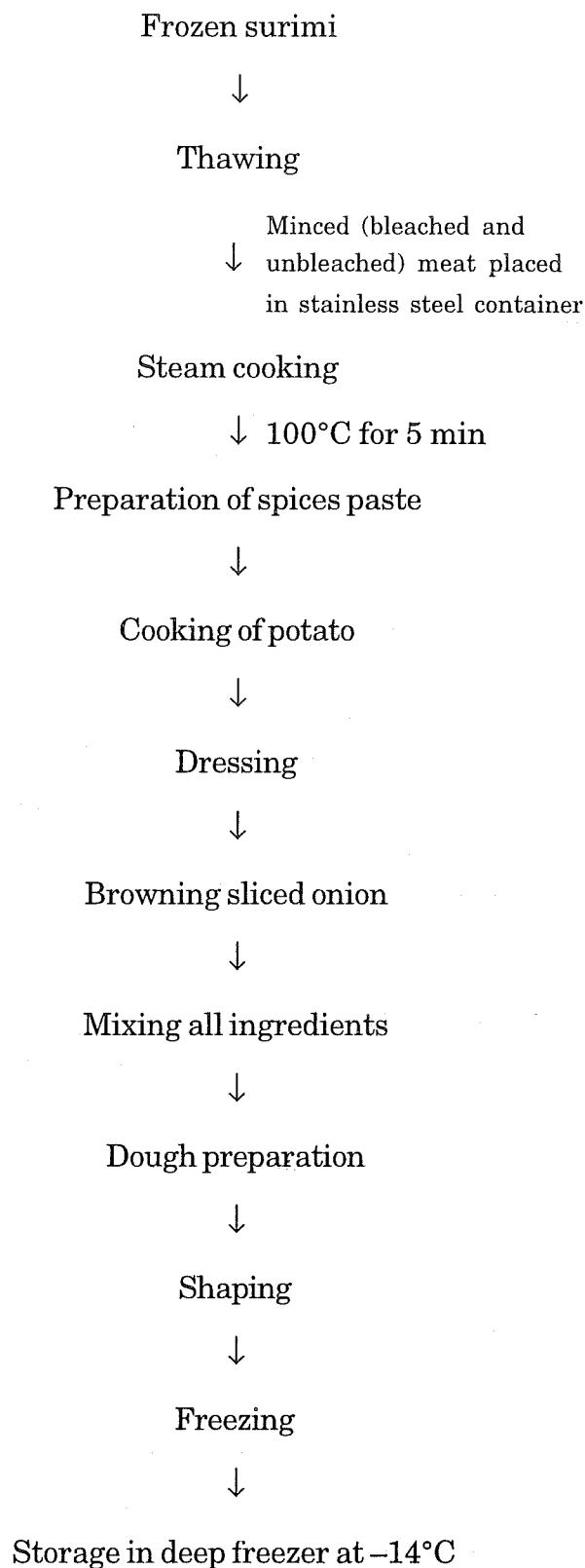
Lean fish meat cutlets have been stored under frozen condition for 5 to 6 months (Gopakumar, 1988; Yaligar *et al.*, 1993). An attempt has been made in the present study to evaluate the shelf life of frozen mackerel mince cutlet (both bleached and unbleached) in deep freezer.

## MATERIAL AND METHODS

Fresh mackerel purchased from the market was washed, dressed, filleted, chopped into mince, washed 6-7 times in water (Suzuki, 1981), centrifuged, passed through strainers, mixed with 5% sorbitol and 0.3% polyphosphate, packed and stored in a freezer at  $-14^{\circ}\text{C}$ . This was used as and when required. Similarly, unbleached mackerel mince was prepared by omitting the washing and centrifuging processes.

Fish cutlet was prepared from bleached and unbleached fish meat according to the standardised method (Flow chart 1) and recipe (Gopakumar, 1988) with slight modification, *i.e.*, fish mince was steamed for five minutes at  $100^{\circ}\text{C}$  (Table 1). The cutlets were subjected to organoleptic evaluation by a group of 10 trained panelists using a 10-point hedonic scale, *viz.*, Excellent - 10, Very good - 9, Good - 8, —, Very poor - 1.

## Flow chart 1. Standardised method of Fish cutlet preparation



**Table 1: Standardized recipe of fish cutlet**

Ingredient	Percentage
Cooked fish meat	40
Salt	2
Oil	4
Green chilly	2.6
Coriander leaves	2
Ginger	3
Garlic	2
Onion	10
Potato (cooked)	20
Pepper powder	0.12
Clove powder	0.12
Cinnamon powder	0.08
Turmeric	0.08
Bread powder	8
Corn flour	6

Fish cutlet was prepared from bleached and unbleached mackerel meat as above with corn flour at different levels, *viz.*, 5, 10, 15, 20 and 25%, of the cooked mackerel mince meat keeping the other ingredients constant. The cutlet, thus prepared, was subjected to organoleptic evaluation.

Fish cutlet was prepared according to the standard method and recipe incorporating green chilly, coriander leaves, garlic and ginger (GCGG) in equal proportion at different levels, *viz.*, 10, 20, 30, 40 and 50%, of the cooked bleached and unbleached mackerel minced meat. These were also subjected to organoleptic evaluation.

Bleached and unbleached fish cutlets prepared as above without frying were packed in 20 pouches (200-g capacity, 12 µm clear polyester, 10.50 x 20.50 x 3.25 cm). Packed cutlets were frozen in plate freezer and stored in the deep freezer at a temperature of -14°C. Samples were drawn at regular intervals during storage and subjected to biochemical, organoleptic and microbiological analysis. Total volatile base-nitrogen (TVB-N) and trimethylamine-nitrogen (TMA-N) were estimated by Convey micro-diffusion method (Beatty and Gibbons, 1936). Ten grammes of fish cutlet were separately homogenised with 50 ml of distilled water. The pH of the homogenate was directly recorded using a pH meter (Sensex, USA). Microbiological analysis was done as per Speck (1976), and Collins and Lyne (1984).

## RESULTS AND DISCUSSION

The results (Fig. 1) show that the fish cutlet prepared from bleached mincemeat has scored higher values for taste, flavour and overall acceptability as compared to that from unbleached mincemeat.

In the above experiment, it was observed that the cutlet could not retain its shape and was found to crack along the periphery. Therefore, it was decided to incorporate different levels of corn flour to prevent this defect. The results (Table 2) showed that it can be avoided with 15% and above of corn flour levels. In the organoleptic evaluation, the cutlets prepared with 15% corn flour had scored higher values for all the attributes as compared to incorporation at other levels. Between the

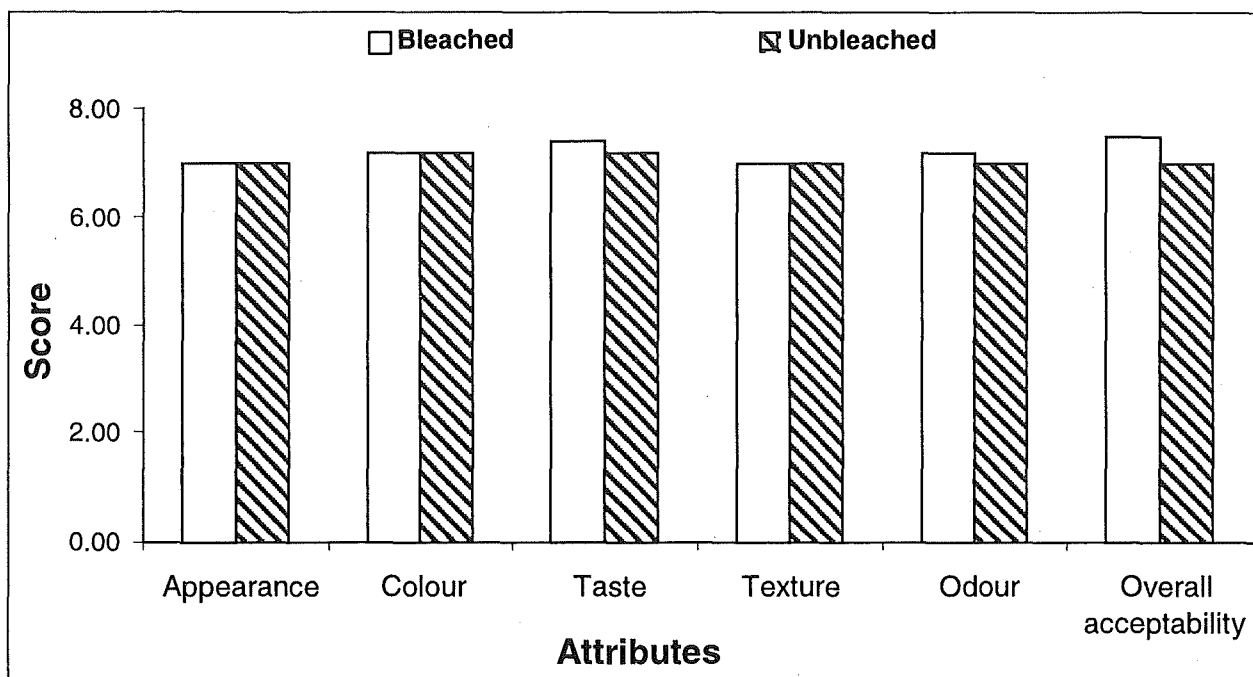


Fig. 1. Organoleptic evaluation of fish cutlet prepared with bleached and unbleached mackerel mincemeat

bleached and unbleached ones, the scores for the cutlets prepared with the former had higher scores than the latter.

**Table 2: Impact of different levels of corn flour on cracks in fish cutlet**

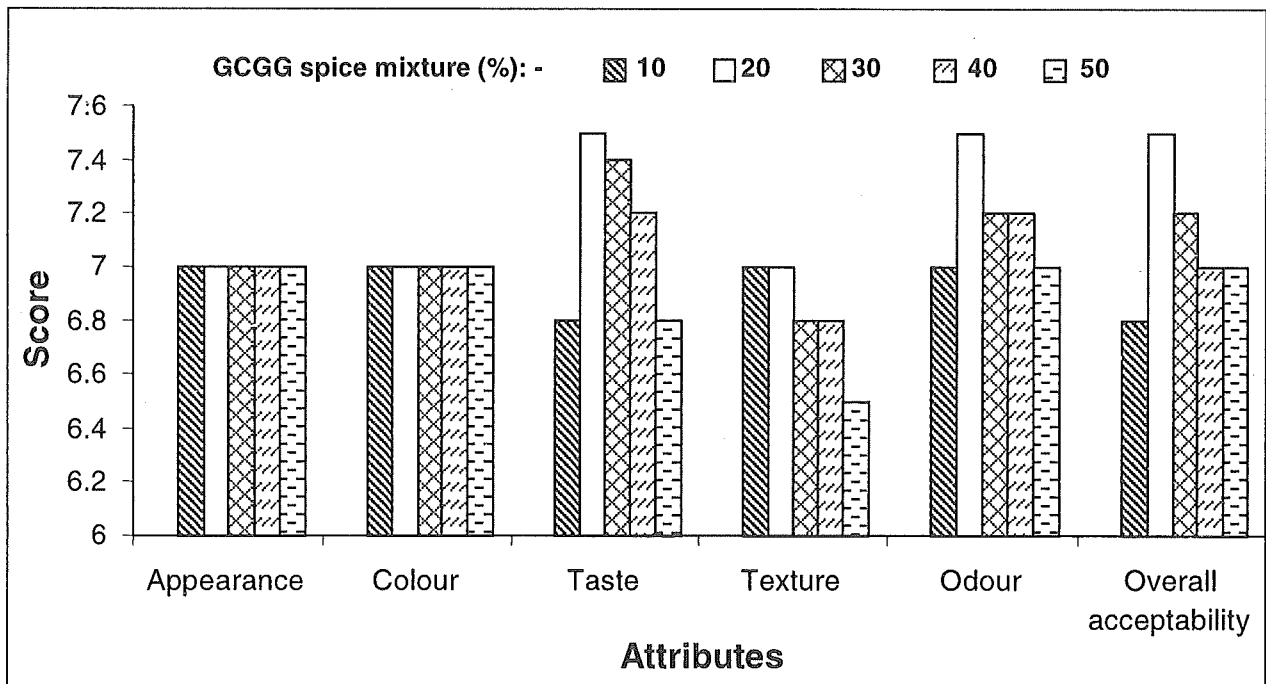
Corn flour (%)	Bleached fish cutlet	Unbleached fish cutlet
5	More cracks	More cracks
10	Less cracks	Less cracks
15	No cracks	No cracks
20	No cracks	No cracks
25	No cracks	No cracks

However, the panelists suggested that the taste of cutlet be improved with better spicy taste and flavour. Hence, an attempt has been made to incorporate different levels

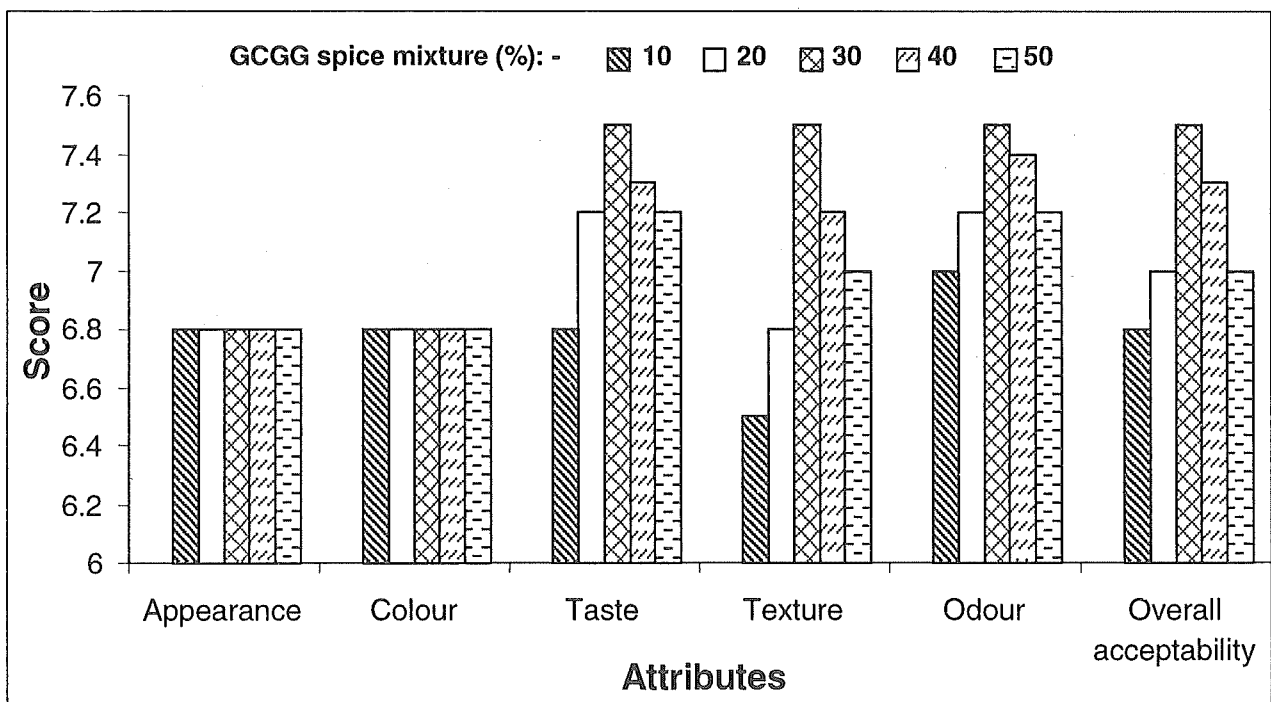
of GCGG spice mixture into the fish cutlet and also to see whether the addition of GCGG spice mixture would improve the taste of cutlet prepared from unbleached fish meat.

The organoleptic evaluation of (Fig. 2) bleached fish mince cutlets prepared with GCGG spice mixture at 20% of the fish mince gave higher scores for taste, flavour, texture and overall acceptability. Unbleached fish mince cutlets prepared with GCGG spice mixture at the rate of 30% of fish mince had higher score for taste, texture and overall acceptability (Fig. 3).

The panelists indicated that both the types of cutlets are acceptable and the choice remains with the consumer to select either the unbleached or bleached fish mincemeat cutlet depending upon which way the consumers think about the health aspect.



*Fig. 2. Organoleptic evaluation of fish cutlet prepared from bleached mackerel mincemeat using different levels of spice mixture*



*Fig. 3. Organoleptic evaluation of fish cutlet prepared from unbleached mackerel meat using different levels of spice mixture*

The proximate composition of cutlets from bleached and unbleached mackerel mincemeat is given in Table 3.

**Table 3: Proximate composition (%) of fish cutlet prepared from bleached and unbleached fish meat**

Parameter	Bleached cutlet	Unbleached cutlet
Moisture	65.01	60.21
Crude protein	12.06	16.2
Crude fat	6.31	14.32
Ash	1.39	1.43

During the frozen storage of bleached and unbleached mackerel mincemeat cutlet, the total plate count decreased (Fig. 4); pH and moisture did not show much variation, whereas peroxide values showed an increasing trend (Table 4). The oxidative changes were more pronounced in cutlet prepared from unbleached fish mince than that from bleached mince. Similar reports on rancidity changes in fatty fishes and their products have been made during frozen storage (Shenouda, 1980; Hultin, 1987; Prabhu *et al.*, 1988; Reddy *et al.*, 1993).



*Fig. 4. Changes in microbial load of fish cutlet prepared from bleached and unbleached mackerel mince during storage at  $-14^{\circ}\text{C}$*

**Table 4: Changes in pH, moisture and peroxide value of fish cutlet prepared from bleached and unbleached fish mince during storage at -14° C**

Parameter Duration (wk)	pH of bleached meat cutlet	pH of unbleached meat cutlet	Moisture (%) of bleached meat cutlet	Moisture (%) of unbleached meat cutlet	PV of bleached meat cutlet	PV of unbleached meat cutlet
Initial	6.5	6.5	65.01	60.21	2.8	3.4
1	6.5	6.5	65.00	60.12	3.2	4.8
2	6.5	6.5	65.01	59.89	3.6	6.2
3	6.5	6.5	64.58	61.95	4.0	8.1
4	6.5	6.4	65.65	60.18	4.6	10
5	6.4	6.4	64.48	60.04	5.3	40
6	6.4	—	64.90	—	6.4	—
7	6.4	—	65.20	—	8.2	—
8	6.4	—	65.85	—	10	—
9	6.4	—	64.70	—	30	—

Similar observations, *i.e.*, gradual reduction in quality characteristics of the fish meat products stored at 0 to 2°C from the first day to the 12<sup>th</sup> day during the storage of fish ball in curry (Balange, 1999); from the first day to the 14<sup>th</sup> day during (microwave) cook-chill storage of fish bakarwadi (Subhedar, 1999); from the first day to the 14<sup>th</sup> day during (microwave) cook-chill storage of fish sausage without casing (Desai, 1999); from the first day to the 22<sup>nd</sup> day during the cook-chill storage of fish ball in spinach curry (Mote, 2001); and from the first day to the 18<sup>th</sup> day during storage of lobster analogs (Satam, 2002), have already been reported. It was observed that there was loss of original flavour thereafter and hence, the panelists rejected the sample.

Organoleptic quality of cutlet prepared from bleached and unbleached mackerel mince did not show changes in appearance, colour and texture during storage. Changes were more prominent in flavour, taste and overall acceptability. Fish cutlets prepared from bleached mackerel meat were acceptable for two months and from unbleached mackerel meat were acceptable up to one month (Fig. 5 - 6). Since the mackerel minced meat (bleached and unbleached) was cooked prior to the preparation of cutlet, there was no chance for changes in the texture as protein was coagulated during cooking and further denaturation during frozen storage is not anticipated.

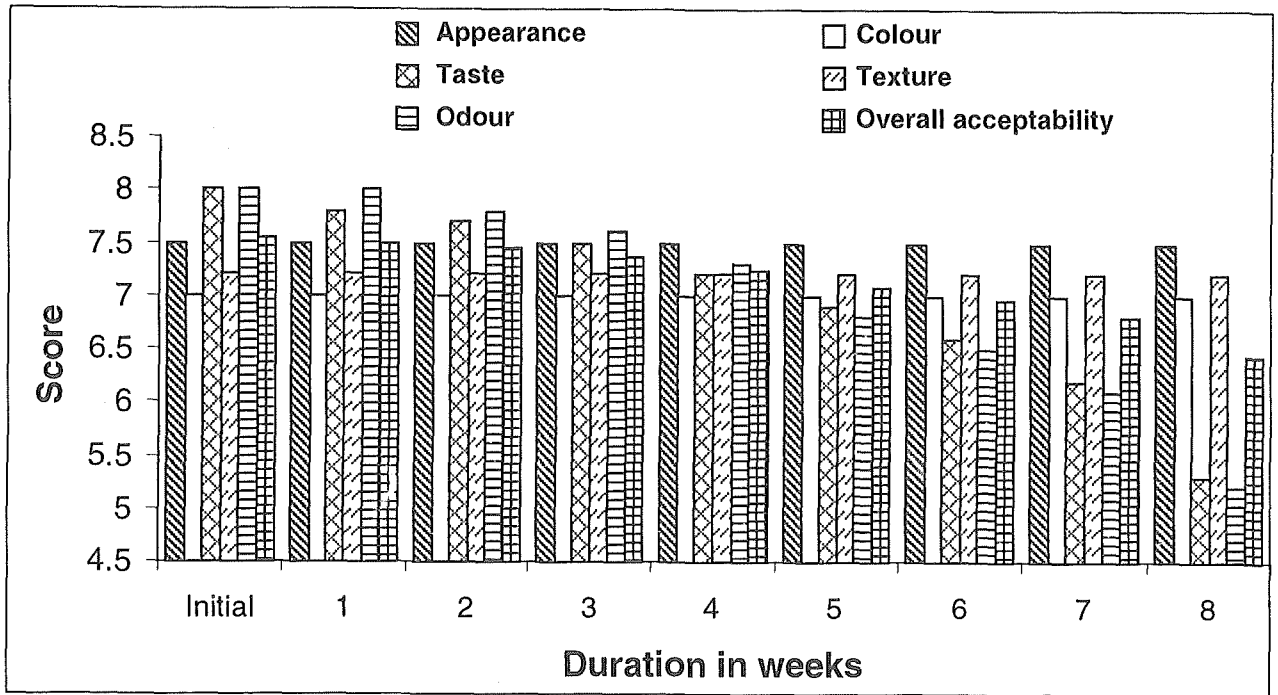


Fig. 5. Changes in organoleptic quality characteristics of fish cutlet prepared from bleached meat during storage at  $-14^{\circ}\text{C}$

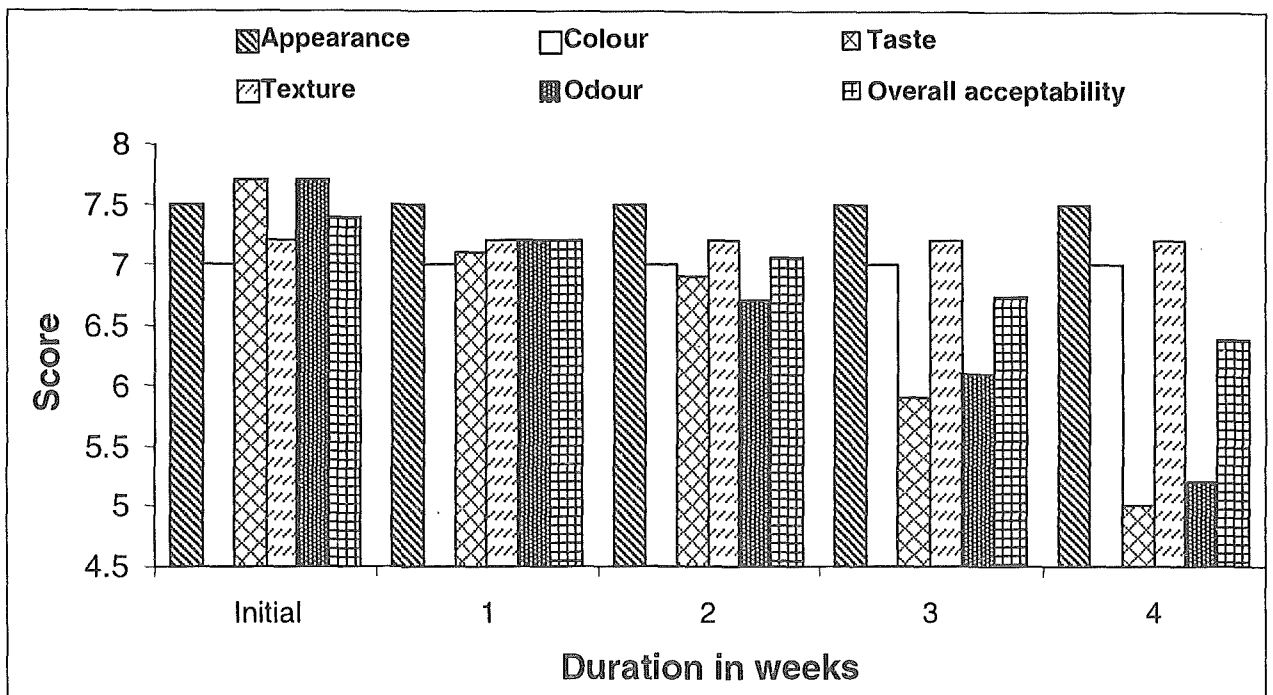


Fig. 6. Changes in organoleptic quality characteristics of fish cutlet prepared from unbleached meat during storage at  $-14^{\circ}\text{C}$

From the above studies, it may be concluded that cutlet prepared from bleached and unbleached mackerel mince

can be stored at  $-14^{\circ}\text{C}$  for two months and one month, respectively.



Gopakumar (1988) and Yaligar *et al.* (1993) found that fish cutlet can be stored for five and 6½ months at -20° C, respectively, from the biochemical, microbiological and organoleptic points of view. The difference in shelf life observed between the present study and the above ones could be due to the low fat content of the fish mince prepared from white meat fish and lower storage temperature as compared to the present study.

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