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Processing of Thalipeeth Flour-Blend from Various Cereal-Pulse Malt Flour and Its Quality Evaluation during Storage

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Abstract: ***Thalipeeth is Maharashtrian ethnic food which is usually consumed during snack with curd or ghee. It is made by combination of pulses and cereals which provide nutritionally balance amount of nutrient and protein. Malting is process which improves the minerals and vitamins such as B_1, B_2 B_6, folic acid and vitamin C and reduces anti nutritional factors like phytate, tannins and oxalates. In this study flours of wheat, rice, Bengal gram dhal, black gram dhal sorghum, soybean and ragi (malted) was taken in equal proportion(i.e. 1:1:1:1:1:1:1) , thalipeeth was made with the traditional method and packed in to standy pouches and kept under ambient condition i.e. at 25 °C+/-2 and at frozen condition i.e. - 4°C+/-2. The storage study was conducted for 60 days. From the study, it is concluded that the quality of ready to eat thalipeeth at ambient as well as at frozen condition were found to be remained in good condition till the last day of analysis (60^h day) with respect to the quality characteristics like sensory, microbial and proximate parameters. However, the frozen product was highly superior in terms of high moisture retention and other quality parameters as compared to ambient stored sample. There were no significant difference observed during 60 days of storage study and therefore, this can be serving as good RTE product for people and it can be consumed at any time either after heating or as such after opening the packet.***

Keywords: Thalipeeth, Malting, combination of pulses and cereals, ambient condition, frozen condition, standy pouches

1. Introduction

In India majority of food consumption is still at home, nevertheless out of home food consumption is increasing due to urbanization, breaking up of traditional joint family system, desire for quality, time which translate into a increased need for convenience, increased number of working women, rise in per capita income, changing lifestyle and increasing level of affluence in middle income group has brought about changes in food habits. In India, consumption of ready to eat and ready to cook food has been significantly increase amongst the age group of 25-40 years (comprises about 60% of population irrespective of affordable price). In India, consumption of cereals and pulses is very high and cereals and pulses contain some antinutritional factors which could affect the digestibility of the food and therefore malting is one of the method used for cereals and pulses to reduce antinutritional factors and it improves digestibility, increases nutrient content. Malting is controlled germination process which activates the enzymes of the resting grain leads to conversion of cereal starch to fermentable sugar and partial hydrolysis of cereal protein.

Thalipeeth is made by using Cereals and pulses in combination. Cereals and pulses are the most important staple diet of the population all over the world. Cereals are cheapest source calories and provide adequate nutrient while pulses provide adequate amount of protein and other nutrients therefore, combination of cereals pulse provide balance diet. Thalipeeth is a Maharashtrian ethnic product and consume during snacks. Thalipeeth is multigrain thin unleavened pancake generally consume along with curd or chutney. Generally a mixture of wheat, rice, Bengal gram dal, black gram dal, ragi, sorghum used for flour of thalipeeth. During making of thalipeeth, Mixture of grains first clean and then roasted for 10-15 min to obtained desirable pleasant flavour. Resultant flour is mixed with fresh spices like chopped onion, garlic, and coriander, spices powder like ajwain, cumin, chilli powder, turmeric, and asafoetida as per the taste, further water is added in the mixture and then it is kneaded into a smooth sticky dough unlike bhakari, a small dough piece is rolled on wet piece of cloth(thickness of 2-3mm in round shape) and transferred to hot pan seamer with oil, then it is the covered for 3-5 min and few holes are punched to facilitate the steam to escape out.

2. Materials and Methods

The raw materials for the present study were chosen to be wheat, ragi, jowar, Bengal gram dhal, black gram dhal; rice, soybean, and oil, masala powder (dry chilli powder, turmeric powder, coriander powder, cumin powder, salt, and ajwain).The thalipeeth was prepared by standard traditional method. The basic preparation of thalipeeth includes dough preparation. For dough preparation raw ingredients (wheat, soybean, rice, Bengal gram dhal, black gram dhal, jowar, ragi was malted and used) was first soaked for overnight (24hrs) and then dried in the cabinet drier for 8hrs at 55°C and roasted till brown colour develop and ground into fine flour. By adding specific quantity of water and curd dough was kneaded with the hand. Dough kept for few minutes to improve its texture of final product. Dough was rolled into thickness of 2-3mm in round shape and transferred to hot iron pan (full flame) seamer with oil and then it was covered for 3-5 min and few holes are punched to facilitate the steam to escape out. Prepared product was stored in different packaging materials(retort pouch, LDPE and PP bags) and

stored at room temperature (25°C+/-2, RH 80%) and frozen temperature (-4°C+/-2, RH 90%).The preservatives used in present study were Sorbic acid- for the present study Sorbic acid used in dough and flour blend in concentration of 0.02%.,Calcium propionate – sodium and calcium propionates are used mostly in the prevention of mold growth and rope development in baked goods. It was used in concentration of 0.05% in dough, Acetic acid – Sorbic acid is effective at lower $P^{H,}$ so to improve activity of Sorbic acid added in thalipeeth, the P^{H} of the product was lowered by adding acetic acid and it was added in concentration of 0.05% in dough of thalipeeth as well as in flour blend.BHA additives –this antioxidant was used on the basis of fat content of the product .it is basically used in oil which is used for roasting in concentration of 0.001%.For the study various packaging material used like LDP, standy pouches, HDPE.

Treatment Details

- T_1 –Control -Wheat, Bengal gram dhal, rice, jowar , ragi, soybean (roasted) (as per traditional method)
- T_2 – Wheat + Bengal gram dhal + ragi + rice + jowar + black gram dhal(soaked)+ spices mixture
- T_3- Wheat (soaked) + rice (soaked)+jowar(soaked) +Bengal gram dhal (soaked)+ black gram dhal(soaked)+ soybean (soaked)+ malted ragi+ spices
- T_4 -Wheat flour (soaked) + rice (soaked) +jowar (soaked) + ragi malted +chana flour (soaked) + black gram dhal + soybean (soaked) +roasted + spices added.
- T_5- preparation of Thalipeeth from above flour blend
- T_6- As above soy defatted replace by soy flour +spices+ preparation of Thalipeeth.
- T_7- As above T_5 + addition of preservative + sorbate(0.2%)+calcium propionate+ acetic acid packaging and storage, quality evaluation

Standardization of proportion of flour in mixture

Treatments		
T_1 (equal amount of flour) wheat 20:rice 20: black gramdhal20: chana dhal20: ragi20: sorghum20: soy flour 20	**T_2** (different proportion of flour) flour blend of wheat 30: rice 30: chana dhal 20: black gram dhal 20	**T_3 (**different proportion of flour) Flour blend of wheat 50: ragi 30: chana dhal 20

T_1, T_2, T_3 flour blends treatments used for making thalipeeth with addition of onion, chillies coriander and salt and compared with the readymade thalipeeth flour. Out of 3 trials taken first trial was most acceptable.

Standardization of amount of water and type of water to be added in the Flour

Treatments			
T_1	T_2	T_3	
50 gm of flour blend	50 gm of flour blend	50 gm of flour blend	50 gm of flour blend
10gm of onion	10 gm of onion	10gm of onion	10 gm of onion
5gm of chillies	5gm of chillies	5gm of chillies	5gm of chillies
5 gm of coriander	5gm of coriander	5 gm of coriander	5gm of coriander
1tsp salt	1tsp of salt	1tsp salt	1tsp of salt
25ml of water	35 ml of water	25ml of water	35 ml of water
		Hot water	Tap water

From above treatments for amount of water T_1 was finalised while for type of water hot water was most acceptable.

Standardization of Various Ingredient of Making Thalipeeth

Oil (ml)	Chillies (gm)	Turmeric	Chilli powder	Coriander powder	Cumin powder	Curd	water	Salt (%)	Onions (gm)	Sesame seeds
2	5	1tsp	1 ½ tsp	1tsp	1tsp	10	25	1	10	1tsp
5	10	¼ tsp	2tsp	1 ½ tsp	1 ½ tsp	20	35	2	15	1 ½ tsp
8	15	1/8 tsp	¼ tsp	2tsp	2 tsp	30	45	3	25	2 tsp

For initial trials onions and chillies were used but for final bulk except onion and chillies other standardise ingredient used. And highlighted treatments were finalised.

Standardization of Dough Making

Treatments			
T_1	**T_2**	**T_3**	**T_4**
50 gm of flour blend	50gm of flour blend	50gm of flour blend	50gm of flour blend
25gm of onion	25gm of onion	25gm of onion	-
5gm of chillies	5gm of chillies	5gm of chillies	-
5gm of coriander	5gm of coriander	5gm of coriander	-
1 ½ tsp chilli powder	1 ½ tsp chilli powder	1 ½ tsp chilli powder	1 ½ tsp of chilli powder
¼ tsp of turmeric powder	¼ tsp of turmeric powder	¼ tsp of turmeric powder	¼ tsp of turmeric powder
1tsp of coriander powder	1tsp of coriander powder	1tsp of coriander powder	1 tsp of coriander powder
1tsp of cumin powder	1tsp of cumin powder	1tsp of cumin powder	1tsp of cumin powder
1tsp of salt	1tsp of salt	1tsp of salt	1 tsp of salt
35 ml of hot water	35 gm of curd	20gm of curd+25ml of hot water	20gm of curd + 25ml of water

Out of four trials taken for dough making T_4 was finalised for bulk preparation. Use of curd and hot water gives smooth and wet texture to the thalipeeth. Though 3rd trial turns out good but due to onions and other fresh materials there are chances of getting spoiled.

Standardized Recipe of Thalipeeth

Ingredients	Amount
Flour blend (equal proportion)	140gm
chilli powder	1 ½ tsp
Turmeric powder	¼ tsp
Coriander powder	1tsp
Cumin powder	1tsp
Salt	1tsp
Sesame seeds	1tsp
Curd	30gm
Water	25ml

3. Results and Discussion

For selecting the most suitable method for the bulk preparation of ready to eat thalipeeth screening of the data obtained by the sensory evaluation of 25 panel members was done. Highest scores obtained to recipe was finalised depend on its sensorial characteristics. For bulk preparation of ready to eat thalipeeth various trials were taken for selecting most suitable method of preparation. Traditional method was used with the some modifications in it. Pre treatment given to the grains for making flour blend like soaking, roasting, drying and malting in case of ragi. Out of these treatments soaking, drying and roasting was finalised for wheat, rice, Bengal gram, black gram and soybean while malting was selected for ragiThree trials were taken for standardization of flour mixture. Out of those three trials T_1 i.e equal proportions of flour was finalised for further study. Three trails were taken and type of water and amount was finalised accordingly, in case of type of water T_3 was finalised and T_1 was finalised for amount of water. Various ingredients like oil salt, chilli powder, turmeric powder, curd, cumin and coriander powder and water percent were finalised for final preparation of thalipeeth. 5% oil, ¼ turmeric powder, 1 ½ chilli powder 1tsp cumin- coriander powder, 20 gm curd, 35 ml water and 2 % salt was finalised for preparation of thalipeeth. Four trails were taken for dough making and out of four trails T_4 was finalised i.e. addition of curd and water which gives smooth and wet texture to the thalipeeth.

Raw Material Analysis

The raw material used for making thalipeeth were grains of wheat, rice, sorghum, black gram dhal, Bengal gram dhal and soybean which were subsequently roasted in laboratory and converted to fine flour using lab flour mill and pass through 60 mesh sieve. The flours were blended at various proportions (treatment) and most acceptable treatment was selected by using sensory panel of judges and then further used same treatment for bulk preparation and storage studies. The results of proximate analysis of the raw material are given in following tables.

Proximate analysis							
Parameter / Ingredient	Moisture (gm)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Ash (gm)	Crude fibre (gm)	Energy (Kcal)
Wheat	12.20	12.10	72.00	1.70	2.70	1.90	351.30
Rice	13.70	6.80	78.50	0.50	0.60	0.20	346.00
Ragi	13.10	8.20	75.10	1.30	2.70	3.60	344.70
Sorghum	13.10	12.10	67.50	5.02	2.30	1.20	363.58
Bengal gram dhal	9.90	20.80	60.70	5.60	3.00	3.90	376.40
Black gram dhal	10.90	24.00	60.20	1.50	3.20	0.90	350.30
Soybean	8.50	43.70	24.10	19.50	4.60	3.70	315.60

Proximate analysis of different grains used in flour blend (on dry basis) per 100gm

For making thalipeeth raw material was procured from local market, ingredient require for making thalipeeth are wheat, rice, ragi, Bengal gram dhal, black gram dhal, sorghum and soybean which are of good quality .The wheat exhibited moisture 12.20 % protein 12.10 % carbohydrate 72% , fat 1.7% , ash 2.7 % while crude fibre 1.9% and energy 351.30Kcal. Rice exhibited moisture 13.7% protein 6.80 %,carbohydrate 78.5%, fat 0.5%, ash 0.6% while crude fibre 0.2% and energy 346 Kcal. Ragi contain moisture 13.10% protein 8.20% carbohydrates 75.1%, fat 1.3% ash 2.7% while crude fibre 3.6% and energy 344.70 Kcal. The sorghum exhibited moisture 13.10%, protein 12.10% carbohydrates 67.5%, fat 5.0%, ash 2.7 % while crude fibre 1.2% and energy 363.58%.Bengal gram dhal exhibited moisture 9.9%, protein 20.8% carbohydrates 60.7%, fat 5.6 %, ash 3% while crude fibre 3.9 % and energy 376.40 Kcal. black gram dhal exhibited moisture 10.9% protein 24%, carbohydrates 60.20% , fat 1.5%, ash 3.2% while crude fibre 0.9% and energy 350.3 Kcal.and soybean exhibited moisture 8.50 %, protein 43.7%, carbohydrates 24.1% , fat 19.5%, ash 3.2% while crude fibre 3.7% and energy 315.6 Kcal.

Proximate composition of malted ragi (on dry basis) per 100gm

Proximate analysis							
Parameters / Ingredient	Moisture (gm)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Ash (gm)	Crude fibre (gm)	Energy (Kcal)
Malted ragi	12.67	10.30	74.10	1.14	2.10	3.18	347.86

From the above table it is observed that malted ragi exhibited moisture 12.67%, protein 10.3%, carbohydrate74.1%, fat 1.14%, ash 2.1% while crude fibre 3.18 % and energy 347.86 Kcal.

Physical processing characteristics of malted ragi flour

Sr. No	Characteristics	Finger millet malt flour
1	Germination characteristic	
a	Weight of raw finger millet	500 gm
b	Weight of soaked finger millet	835 gm
c	Washing grains	2-3 time
d	Soaking time	24 hours
e	Germination period	24-30 hours
f	Germination temperature	25-30°C
g	Drying temperature (cabinet dryer)	55°C
h	Drying period	8-10 hours
i	Weight of grains after germination	890gm
2	Milling characteristics	
a	Flour obtained	300gm (60%)
b	Bran portion (using 60 mesh sieve)	200gm (40%)
3	Flour characteristics	
a	Colour	Off white
b	Texture	Very fine
c	Appearance	Powdery

Malting is important process which improves the nutritive value of all ingredients and bioavailability of nutrient significantly. Ragi has been considered and acceptable malt flour use in various food preparations. During malting seeds are germinated in the controlled conditions and dehydrated and finally converted into fine flour which pass through 60 mesh sieve during this process of malting starch is converted into simple digestible sugar, stored proteins synthesized into amino acids, fatty acid in seeds is converted into essential fatty acids, mineral and vitamins synthesis, flavour compounds also developed and enzyme diastase become more predominant and leads to easy digestion of starch and carbohydrates. Thus as whole nutritive values improve due to malting and hence it is used in various food preparations.

Proximate analysis of defatted soybean flour (on dry basis) per 100 gm

Parameters / Ingredients	Moisture (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Ash (gm)	Energy (Kcal)
Defatted soybean flour	9.1	52.10	2.79	33.05	3.05	365.71

From the above table it is observed that defatted soybean flour exhibited the proximate composition i.e. moisture 9.1%, protein 52.10%, carbohydrate 33.05% mineral content was 3.05% while energy 365.71 Kcal.

	Proximate analysis						
Parameters / Ingredients	Moisture (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Ash (gm)	Crude fibre (gm)	Energy (Kcal)
Flour blend	10.20	13.50	3.57	72.21	0.69	3.50	374.97

Proximate composition of most acceptable flour blend (on dry basis) per 100 gm* (wheat 20: rice 20: sorghum 20: ragi malted 20: defatted soybean 20: Bengal gram dhal 20: black gram dhal 20). Proximate composition of flour blend is given in 4.1.d, from the above table it is observed that flour blend exhibited moisture 10.20 %, protein 13.50%, fat 3.57%, carbohydrate 72.21%, ash 3.50 % while crude fibre 3.50% and energy 374.97 Kcal.

Proximate analysis of finished product:
Analysis of thalipeeth and flour blend was done on the basis of proximate analysis, microbial analysis and sensory quality analysis. 20 panel members has selected for the sensory analysis of the product stored for 60 days.

Changes in proximate composition of ready to eat thalipeeth stored at ambient condition*(25°C +/- 2)

Day / Parameters	0^{th} day	10^{th} day	20^{th} day	30^{th} day	40^{th} day	50^{th} day	60^{th} day	SE +/-	CD at 5%
Moisture (gm)	18.58	18.55	18.50	18.40	18.32	18.26	18.10	0.30	0.90
Protein (gm)	19.25	19.27	19.28	19.32	19.36	19.42	19.48	0.28	0.84
Carbohydrate (gm)	48.47	48.49	48.50	48.55	48.57	48.59	48.65	0.18	0.54
Fat (gm)	10.90	10.90	10.86	10.80	10.76	10.76	10.72	0.23	0.69
Ash (gm)	3.80	3.80	3.77	3.74	3.70	3.67	3.65	0.15	0.48
Crude fibre(gm)	3.10	3.05	3.60	3.50	3.40	3.10	3.40	0.22	0.66
Energy (Kcal)	368.10	314.60	314.76	368.32	368.88	368.88	369.00	0.9	2.7

The data on changes in proximate composition of thalipeeth (RTE) stored at ambient condition is presented in above table from the data it was revealed that proximate constituent like moisture was found to be 18.58 % on 0^{th} day and that of on 60^{th} day 18.10 %. In case of protein the values on 0^{th} day was 19.25 % and that of on 60^{th} day 19.48 %. Fat percent on 0^{th} day was 10.90 % and on 60^{th} day 10.72 %. Carbohydrates on 0^{th} day 48.47 % while on 60^{th} day it was 48.65%. Crude fibre on 0^{th} day was 3.10 % and on 60^{th} day 3.40 %. While energy on 0^{th} day was found to be 368.10 kcal while on 60^{th} day it was found to be 369.00Kcal.The deference in all above parameters i.e. on 0^{th} day and 60^{th} day were statistically found to be insignificant thus during the storage of thalipeeth (RTE) at ambient condition there was no significant changes were observed.

Changes in proximate composition of ready to eat thalipeeth stored at frozen condition.*(-4°C+/-2)

Day / Parameters	0th day	10th day	20th day	30th day	40th day	50th day	60th day	SE +/-	CD at 5%
Moisture (gm)	18.58	18.55	18.51	18.47	18.43	18.39	18.35	0.23	0.69
Protein (gm)	19.25	19.28	19.31	19.35	19.37	19.39	19.42	0.22	0.66
Carbohydrate(gm)	47.47	47.48	47.50	47.55	47.59	47.62	47.67	0.20	0.60
Fat (gm)	10.90	10.92	10.94	10.97	10.99	10.99	11.00	0.11	0.33
Ash (gm)	3.80	3.82	3.85	3.87	3.89	3.91	3.93	0.10	0.30
Crude fibre (gm)	3.10	3.12	3.15	3.17	3.18	3.20	3.22	0.06	0.18
Enegry (Kcal)	366.88	365.32	366.13	366.33	366.87	366.95	367.36	2.04	6.12

The data on changes in proximate composition of RTE thalipeeth stored at frozen condition is presented in table 4.2.b, from the data it can be revealed that proximate constituent like moisture was found to be 18.58% on 0^{th} day while on 60^{th} day it was 18.35%. In case of protein the value at 0^{th} day was 19.25% and that of on 60^{th} day was 19.42%. A carbohydrate on 0th day was 47.47% and that of on 60^{th} day was 47.67%. Fat on 0^{th} day was 10.90% while on 60^{th} day was 11.00%. In case of ash on 0^{th} day was 3.80% and that of on 60^{th} day was 3.93%. Crude fibre on 0^{th} day was 3.10% and on 60^{th} day was 3.22% while energy on 0^{th} day was 366.88 Kcal and on 60^{th} day was 367.36Kcal.
The deference in all above parameters of RTE thalipeeth on 0^{th} day and 60^{th} day were statistically found to be insignificant. Thus, RTE thalipeeth on frozen condition were found to be in good condition and there were no significant changes under frozen condition storage.

However, in case of Jowar bhakari (M35-1) no significant difference was notice in moisture and other parameters after baking (Naikare and Kadam, 1982). In another studies carried out on Puran Poli storage studies at refrigerated condition, Kanitkar (2009)?? Observed that there were no significant changes in moisture as well as other components in product when it was stored under refrigerated condition

Microbial analysis
Microbial analysis of finished product: The microbial examination was conducted as per the standard procedures for the fresh product sample and stored sample of Thalipeeth.

Microbial analysis of ready to eat Thalipeeth stored at ambient condition*(25°C +/- 2)

Days / Dilutions	0^{th} day	60^{th} day
10^{-1}	2×10^{-1}	12×10^{-1}
10^{-2}	3×10^{-2}	13×10^{-2}
10^{-3}	3×10^{-3}	10×10^{-3}
10^{-4}	4×10^{-4}	12×10^{-4}
10^{-5}	4×10^{-5}	13×10^{-5}
10^{-6}	5×10^{-6}	15×10^{-6}
10^{-7}	6×10^{-7}	12×10^{-7}
10^{-8}	5×10^{-8}	10×10^{-8}
10^{-9}	6×10^{-9}	16×10^{-9}
10-^{10}	$7\times10\text{-}^{10}$	15×10^{-10}

***mean of three observations**

Data on the microbial analysis of the prodcut was given in table 4.3.a. From the table 4.3.a, it is observed that the total plate count of RTE thalipeeth was on 0^{th} day was 2×10^{-2} Cfu/ml while on 60^{th} day it was 15×10^{-10} Cfu/ml.
It means that the values indicate increasing trend of Cfu count in the product as the storage period advances, however the difference observed are statistically insignificant. Hence no significant change was observed in the product
Cfu: Colony forming units

Microbial analysis of ready to eat thalipeeth stored at refrigerated condition.*(-4°C+/-2)

Days / Dilutions	0^{th} day	60^{th} day
10^{-1}	1×10^{-1}	10×10^{-1}
10^{-2}	2×10^{-2}	11×10^{-2}
10^{-3}	3×10^{-3}	12×10^{-3}
10^{-4}	4×10^{-4}	11×10^{-4}
10^{-5}	5×10^{-5}	13×10^{-5}
10^{-6}	6×10^{-6}	15×10^{-6}
10^{-7}	5×10^{-7}	12×10^{-7}
10^{-8}	6×10^{-8}	10×10^{-8}
10^{-9}	6×10^{-9}	16×10^{-9}
10-^{10}	$7\times10\text{-}^{10}$	15×10^{-10}

***mean of three observation**

Data on the microbial analysis of the prodcut was given in table 4.3.b. From the table no 4.3.b it is observed that the total plate count of RTE Thalipeeth on 0^{th} day was 1×10^{-1}Cfu/ml while on 60^{th} day 15×10^{-10} Cfu/ml. It means that the values indicate increasing trend of Cfu/ml count in the product as the storage period advances, however the difference observed are statistically insignificant. Hence no significant change was observed in the product
Cfu: Colony forming units

Sensory analysis: Sensory analysis of the **thalipeeth** was done by using 5 point hedonic scale. 20 panel members were employed for this sensory evaluation. The product is evaluated on the basis of its parameters as colour, texture, flavour, apperance and overall acceptability

Sensory analysis of ready to eat thalipeeth at ambient conditon *(25°C +/- 2)

Storage Days / Parameters	0 day	10 day	20 day	30 day	40 day	50 day	60 day
Colour (5)	4.23	4.50	4.18	4.02	4.19	4.20	4.20
Texture (5)	4.23	4.30	4.17	4.14	4.23	4.12	4.12
Flavour (5)	4.17	4.16	4.18	4.56	4.29	4.20	4.20
Appearance (5)	4.11	4.21	4.32	4.50	4.05	4.05	4.05
Overall acceptability (5)	4.59	4.21	4.21	4.26	4.3	4.3	4.3
Means of mean	4.27	4.28	4.21	4.30	4.21	4.17	4.17
Rank	1	1	1	1	1	1	1

*Means of three observations obtained by 20 panel judges using 5point hedonic scale
Keys: 5-excellent, 4-very good, 3- good, 2-modarate, 1-poor

Changes in sensory analysis of ready to eat thalipeeth at refrigerated condition *(-4°C+/-2)

Storage Days / Parameters	0th day	10th day	20th day	30th day	40th day	50th day	60th day
Colour (5)	4.25	4.55	4.18	4.22	4.19	4.55	4.5
Texture (5)	4.23	4.3	4.17	4.14	4.23	4.2	4.24
Flavour (5)	4.17	4.16	4.18	4.56	4.29	4.18	4.20
Appearance (5)	4.11	4.21	4.32	4.5	4.05	4.9	4.18
overall acceptability (5)	4.59	4.21	4.21	4.26	4.3	4.21	4.6
Mean	4.27	4.28	4.21	4.33	4.21	4.40	4.34
Rank	1	1	1	1	1	1	1

*means of three observations obtained by 20 panel judges using 5point hedonic scale
Keys: 5-excellent, 4-very good, 3- good, 2-modarate, 1-poor

Costing of raw material

Ingredient	Amount	Rate / Kg (ruppe)	Price (rupee)	Manufactured by
Wheat	120	22	3	Local market
Rice	120	36	4.3	Local market
Black gram dhal	120	55	7	Local market
Bengal gram dhal	120	61	7.3	Local market
Soybean	120	56	7	Local market
Ragi	120	28	3.36	Local market
Sorghum	120	41	5	Local market
Chilli powder	10	120	1.2	Local market
Turmeric powder	5	190	0.95	Local market
Cumin powder	10	170	1.7	Local market
Curd	500	100	50	Local market
Coriander powder	10	430	4.3	Local market
Oil	30	80	2.4	Local market
Salt	10	20	0.2	Local market
BHA	0.002	1,600	0.003	Local market
Sorbic acid	0.4	4300	1.72	Local market
Acitic acid	0.1	650	26	Local market
Calcium propionate	0.1	2750	0.27	Local market
Labelling cost	1	3	3	Local market
Standy pouch	10	160	16	Local market
Total	**145**			

Note: The above table shows the costing for final bulk preparation of ready to eat Thalipeeth i.e. for 1.3 Kg which had a total cost of Rs. 145.00

Calculation:

a. 1.3 kg of total preparation cost for Rs.145.00

Therefore 150 gm of net product cost is Rs. 17 which a cost price without addition of any profit

Addition of over head charges (40%)	17 ×40/100	7.0
Addition of profit (20%)	17 ×20/100	3.4
Addition of taxes (if any 12.5%)	17×12.5/100	2.1
Addition of returns (5%)	17×5/100	0.8
Addition of profit (15%) (dealers concession + distribution cost	17×15/100	2.5

Addition of above charges to the cost price we get a MRP price of,

15.8 + 16 = 32.8 (approx Rs 33)

MRP = 33/-

4. Summary and Conclusion

Thalipeeth is Maharashtrian ethnic product and made up of cereals- pulses combination. In India cereals and pulses are the staple diet of the population. In today's world everyone is busy and therefore there is need of ready to eat or instant food because of increase need of convenience.

The main objective of the study was to improve the shelf life of the product. This snack is widely available in market but no attempts had been taken to development of thalipeeth or extending its shelf life. Thalipeeth is prepared with combination of cereals and pulses which provide balance amount of protein and other nutrients. Malting is another method used to improve the nutritive value of the product. In this study malting is done for ragi, because it's most acceptable and palatable after malting. Malting decreases anti nutritional factors such as phytate, tannins and oxalates at the same time increases various minerals and vitamins such as B_1, B_2 B_6, folic acid and vitamin C and amylases. Therefore malting is used in case of ragi.

Thalipeeth is multigrain thin unleavened pancake generally consume along with curd or chutney. Generally blend of flours like wheat, rice, bengal gram dhal, balck gram dhal, ragi, sorghum used for making thalipeeth by traditional method. Mixture of grains first clean and then roasted for 10-15 min to obtained desirable pleasant flavour. After grinding resultant flour is mixed with fresh spices like chopped onion, garlic, and coriander, spices powder like ajwain, cumin, chilli powder, turmeric, and asafoetida as per the taste, further water is added in the mixture and then it is kneaded into a smooth sticky dough unlike bhakari, a small dough piece is rolled on wet piece of cloth(thickness of 2-3mm in round shape) and transferred to hot pan seamer with oil, then it is the covered for 3-5 min and few holes are punched to facilitate the steam to escape out. In processing of thalipeeth various operation involved are cleaning grains soaking, drying, malting and finally roasting of grains, grind into fine flour. Flour mixture was blend in desirable proportion for preparation of thalipeeth by traditional method. Packaging of finished product in standy pouches which filling under laminar flow. Various treatments were planed with variation in flour blend (i.e four trials were taken), the thalipeeth was prepared from each flour blend (recipe) and after proper baking and cooling served to a panel of 20 judges for sensory evaluation . from the score card sheet most acceptable treatment was selected and further used in bulk preparation and same was packed and kept for storage study (at ambient and frozen conditions) thalipeeth preparation used as explained above.

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