



Process Standardization and Quality Evaluation of Traditional Kolhapuri Gravy

Tejaswini A. Vhaskoti, Abhijeet A. Gatade and Akshaya K. Sahoo

Department of Food Science and Technology, Shivaji University

Kolhapur – 416004, Maharashtra, India

E-mail: tejuvhaskoti1995@gmail.com

ABSTRACT

The territory of Maharashtra based on culinary culture can be divided into Konkan, Desh, Khandesh, Marathwada and Vidarbha region. Desh region includes mainly Pune, Satara and Kolhapur districts. The Kolhapuri cuisine with its rich non-vegetarian dishes and spicy gravies acquaint people with the flavours of the royal Marathi kitchens. An attempt has been made in optimizing the recipe for the traditional Kolhapuri gravy, so that one can be able to relish the Kolhapuri flavour at anyplace at any time. Various formulations were tried in order to standardise process. Out of five formulations, sample E was selected based on the results of physical analysis and sensory evaluation. Prior to formulations all the ingredients were analysed for chemical parameters to justify their role in providing the desired quality in the gravy. The chemical analysis of selected sample i.e. sample E revealed that, the traditional Kolhapuri gravy beside its richness in flavour it was also rich in protein (10%), total carbohydrates (8%), fibre (7.09%) and total minerals (5.5%). The moisture content of gravy was 33.05%, which makes the product in a category of intermediate moisture food. Using these research findings one can be able to promote the regional delicacies of Indian traditional food and standardise them for regulatory compliance.

Keywords: Kolhapuri gravy, Optimization, Standardisation, Traditional food

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INTRODUCTION

Traditional foods have played an important role in sharing different culture and showcasing region specificity for thousands of years, including foods that have been consumed locally and regionally for an extended time period. Preparation methods of traditional foods are part of the folklore of a region. Traditional food is a food with specific feature which distinguish it clearly from other similar product of same category in terms of use of “traditional ingredients” or “traditional composition” or “traditional types of production or processing method”[1].

Indian cuisine consists of a wide variety of regional and traditional cuisines native to the Indian subcontinent. Traditional foods have been influenced by many factors. One of these factors is the availability of raw materials. Given the range of diversity in soil type, climate, ethnic groups and occupations, these cuisines vary substantially from each other and use locally available spices, herbs, vegetables and fruits. Indian food is also heavily influenced by religion, cultural choices and traditions [2, 3].

Indian traditional cuisine gives the image and the feelings of tantalizing food steeped in various fragrant spices and gravies enriched with different types of flavours through exotic and amazing methods of cooking [4].

Amongst all the Indian traditional food, vegetarian and non-vegetarian dished prepared in gravy form are the soul of Indian cuisine. Gravy is a thick liquid of saucy consistency that provides body and flavour to the dishes and other food preparation. It provides all the five basic tastes that are bitter, hot, sweet, sour, and salty. Based on the ingredients used and method of preparation the Indian gravies are categorised as, White gravy, Red gravy, Brown gravy, Shahi gravy and Green gravy [5, 6, 7, 8, 9].

It is evident that each region has its own specialty in these types of gravies. The regional territory of Maharashtra can be divided into the Konkan, Desh, Khandesh, Marathwada and Vidarbha. The climatic and cultural peculiarities of every region are reflected in the ingredients and tenor of its food. Types of Maharashtrian gravies based on regions are Malvani Gravy, Vidarbh Gravy, Kokani Gravy, Marathwada Gravy and Kolhapuri Gravy. The Desh region includes the districts of Maharashtra like Pune, Satara and Kolhapur. Among these districts, Kolhapur district is well known for its royal cuisines and spicy food

habits of people. More specifically, the Non-Vegetarian dishes of the meat, chicken and egg cookery highly evolved in this region and are most popular even through the country. Kolhapuri Basic Gravy is medium spicy gravy, prepared mainly with the tomatoes, sautéed onions, cashew nuts, a horde spice powders and pastes, including a special kanda-lasun masala powder, which gives the basic Kolhapuri gravy a brilliant flavour. Being a tangy medium- spicy one, this gravy is quite versatile and goes well with a range of vegetables, paneer and beans too. Gravies contain number of spices which makes the gravies not only tasty but also nutritious. They play a key role in providing micro and macro nutrients. Many spices have rich sources of calcium, phosphorus, magnesium and micronutrients such as zinc. Spices are also rich sources of phenolic compounds with antioxidant activity which influence nutrition through many pathways [9].

Considering the convenience along with nutritional aspects of traditional food, much more emphasis is being given by the food scientist and food engineer on standardization Indian traditional food. Hence, in the present food research work, attempts were made for standardization Kolhapuri Gravy in a scientific, in order to provide an optimized process for people throughout the globe, so that anyone at any place will be able to relish the flavour of Maharashtrian Cuisine in an authentic way.

MATERIALS AND METHODS

Materials

All the raw materials required (spices, condiments and other minor additives) were procured from the local market of Kolhapur city of Maharashtra state. All spices and other ingredients of local varieties of were used for preparation of gravy. The procured ingredients were stored in an air tight PET container, to preserve the natural qualities, especially flavour integrity.

Methods

Preparation and Chemical Analysis of Spices

All the spices were converted into an analysable form by grinding them. The powdered spice samples were packed and stored in an airtight sample containers and were stored at cool and dry place. All the spices were evaluated for chemical constituents like, moisture (by hot air drying method), protein (by micro-kjeldhal's method), fat (by soxhlet extraction method), crude fibre (by Weende's method) and total mineral content (by dry ash method), following standard AOAC reference procedures [10].

Standardization of Kolhapuri Gravy by optimizing the formulation

A through field study and literature review was conducted in order to select a best recipe for standardization of Kolhapuri Gravy. Five most popular and generally used methods for preparation of Kolhapuri Gravy were selected. The methods were different mostly in their ingredients and their amount used. The formulations of all these five recipes are given in table 1. The gravies were prepared by following only one process, the steps of which are depicted in the flow charts, as shown in figure 1. All the gravies were also optimized for cooking time. Each sample was cooked for 5 min., 10 min. and 15 min. in order to study the effect of cooking time on gravy quality [1].

Table1: Various formulations for standardization of Kolhapuri Gravy

Ingredients	Sample A	Sample B	Sample C	Sample D	Sample E
	Amount of Ingredients (%)				
Tomato	75	60	50	55	58
Cashew nuts	0.5	1.5	2	2.5	3.96
Kashmiri red chilli	-	0.5	0.8	0.9	1.05
Cumin seeds	0.50	-	0.40	0.20	0.30
Bay leaf	0.2	0.4	0.6	0.8	0.10
Cloves	0.5	0.10	0.15	0.18	0.21
Cardamoms	-	0.10	0.15	0.20	0.30
Cinnamons	-	0.01	0.02	0.04	0.05
Garlic-ginger paste	1	1.25	1.50	2	2.11
Green chilli paste	0.25	0.50	0.75	1	1.25
Turmeric powder	0.10	0.12	0.12	0.14	0.15
Coriander powder	0.10	-	0.15	0.20	0.25
Garam masala	-	0.10	0.15	0.20	0.25
Onions	10	14	15	16	18
Kanda-lasun Masala	0.25	0.25	0.50	0.75	1.05

Salt	0.5	0.8	0.9	1	1.02
Butter	0.2	0.3	0.5	0.9	1.05
Oil	2.50	5	6	7	7.40
Water	-	1	2	3	3.50

Select good quality Tomatoes, Cashew nuts and Kashmiri Red Chillies

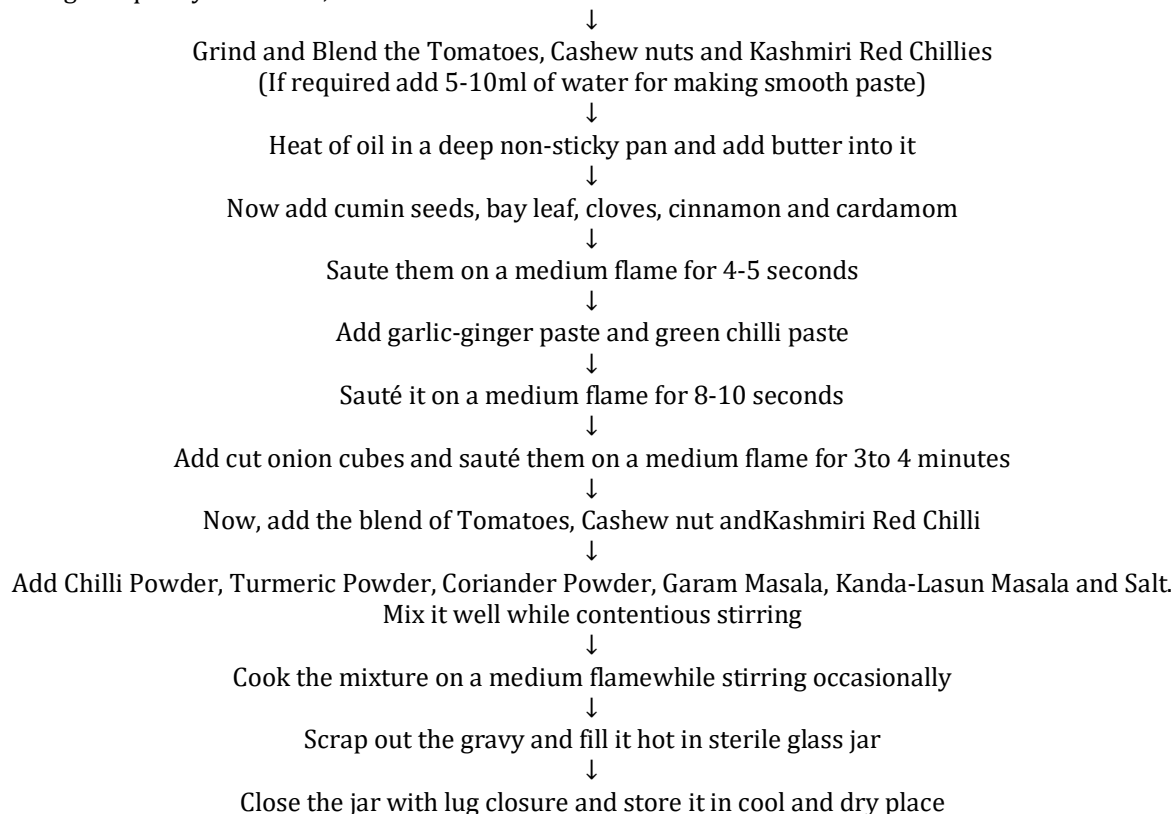


Figure 1: Process flow chart for preparation of Kolhapuri gravy

Physical analysis of standardized Kolhapuri gravy samples

All the prepared Kolhapuri gravy samples were analysed for the physical parameters like weight and yield of the gravy. The weight of prepared gravy was measured by subtracting the empty weight of glass jar from the weight of glass jar after filling the gravy. Hence the yield of the gravy was determined by using following formula.

$$\% \text{ Yield of Gravy} = \frac{\text{Weight of Gravy Prepared}}{\text{Weight of Raw Ingredients Used}} \times 100$$

Sensory analysis of standardized Kolhapuri gravy samples

The prepared samples were analysed for sensory attributes like colour, flavour, texture, taste and overall acceptability using a panel of 10 semi-trained sensory analysts. A 9-point hedonic rating scale was used by the panellists to score the quality attributes [11].

2.2.5. Chemical analysis of standardized Kolhapuri Gravy

The sample selected based on physical quality and sensory analysis result was selected for determining the chemical quality i.e. nutritional quality. The standardized Kolhapuri gravy was analysed for moisture, protein, fat, crude fibre, total minerals, total carbohydrate content and energy value by using standard AOAC methods [10].

RESULTS AND DISCUSSION

Chemical analysis of Spices, Condiments and Other Ingredients

The results of chemical analysis of spices, condiments and other ingredients used for preparation Kolhapuri Gravy are tabulated in table no. 2. The results indicated good chemical quality and were in line with results reported earlier by some researchers in the field. Tomato contains 90% moisture, 11.44%

crude fibre and 8.75% total minerals. Cashew was rich in carbohydrates i.e. 30.20%, proteins 18.22% and fat 43.85% which was contributed in texture of the gravy and made it more nutritious. Kashmiri red chili contains 30% of crude fibre and 8% total minerals. Bay leaves contain 74.99% total carbohydrates. The results also provide information about absence of any adulterant in spices.

Table 2: Chemical composition of ingredients

Name of Ingredients	Amount of Chemical Constituents in %					
	Moisture	Total Minerals	Protein	Fat	Total CHO	Crude Fibre
Tomato	94.10	8.75	0.8	1	3.25	11.44
Cashew nut	5.5	2.4	18.22	43.85	30.20	3.30
Kashmiri red chilli	12	8	1.8	0.1	3	30
Cumin seeds	6	8	18	22	44	39
Bay leaf	8	9	7.61	8.30	74.99	12
Cloves	10	5.2	12	17	24	20
Cinnamon	4	2.4	8	1	27	32
Cardamoms	5	6.72	12	10.76	25	24.14
Garlic-ginger paste	70	1.7	2.5	42	6	5
Green chili paste	73	0.8	2	0.2	9	3
Turmeric powder	10	2.85	15	15	21	4.60
Coriander powder	8	17.47	10.46	1	1	44.81
Garam masala	12	10	13.6	15.2	25	17.91
Onion	85	10	1.1	0.1	9.3	1.7
Kanda-lasun masala	9	4.60	9.30	16	27.37	6.50
Butter	15	2.11	1.1	81.5	-	-

Physical analysis of prepared Kolhapuri gravy samples

Table 3 shows the results for the yield of the Kolhapuri gravy and cooking time of gravy. Yield of the gravy varies from 14% to 26%. The major ingredient for the Kolhapuri gravy was tomatoes which contain 90% of the moisture and during cooking the moisture of the major ingredient was reduced so that it directly showed the effect on the yield of the Kolhapuri gravy. Another factor which majorly showed the effect on yield of the gravy was cooking time.

Table 3: Physical parameters of Kolhapuri gravy

Sample code	Total weight of ingredients (g)	Cooking time (min.)	Weight of prepared gravy (g)	Yield of gravy (%)
Sample A1	500	5	497.50	99.50
Sample A2	500	10	441.25	88.25
Sample A3	500	15	390.00	78.00
Sample B1	500	5	422.50	84.50
Sample B2	500	10	366.00	73.20
Sample B3	500	15	315.00	63.00
Sample C1	500	5	373.50	74.50
Sample C2	500	10	316.25	63.25
Sample C3	500	15	265.00	53.00
Sample D1	500	5	397.50	79.50
Sample D2	500	10	341.25	68.25
Sample D3	500	15	290.00	58.00
Sample E1	500	5	412.50	82.50
Sample E2	500	10	356.25	71.25
Sample E3	500	15	305.00	61.00

Effect of ingredients and cooking time on sensory attributes of Kolhapuri gravy

All the samples of Kolhapuri gravy were evaluated to determine the effect of the used formulation and cooking time on the sensory attributes of gravy. The results of sensory analysis are reported in table no. 4. Sample A was made up of one third amount of tomatoes. It also includes a small amount cashew nut, cumin seeds, cloves, bay leaf, garlic-ginger paste, turmeric powder, coriander powder etc. The sensory evaluation revealed that the sample A₁ gave a slight good colour but the flavour of spices are not that much good as sample A₂. A₂ sample showed a better colour than A₁ and A₃. In sample A₃, colour of the gravy was too dark and taste was also not that much good. It means that increased cooking time affected

the colour as well as flavour of the gravy. The sample A₂ scored highest points for all the parameters which mean that the spices used in the gravy gave a perfect colour, flavour and taste when they were cooked at 10 mins.

Sample B was composed of reduced amounts of tomatoes, tripled the amount of cashew nuts, addition of Kashmiri red chili and water, doubled amount of bay leaf, cloves, green chilli paste and addition of garam masala, water, cardamom and cinnamon. Sensory evaluation of gravy revealed that sample B₂ scored highest points for all the parameters i.e. colour, flavour, texture, taste and overall acceptability. Sample B₁ showed poor flavour and texture s compared to sample B₂ and B₃. Sample B₁ contain increased amount of tomatoes and it was rich in moisture so it directly affects the texture of the gravy and showed a liquid like texture for gravy. However, sample B₂ showed a good texture and taste, colour than sample B₁ and B₃. Sample B₃ scored less than B₂ for the texture because Sample B₃ showed a much solid texture and which showed an adverse effect on taste and flavour also.

Sample C contain more amount of Cashew nuts, increased amount of Kashmiri red chilli, bay leaf and ginger-garlic paste, addition of cumin seeds and coriander powder. All the three samples i.e. sample C₁, C₂ and C₃ were evaluated by sensory analysis and it showed that sample C₁ was poor in flavour than both the other samples but sample C₃ showed poor results for the colour of the gravy. However, sample C₂ gave a best result for all the parameters because in sample C₁ flavour of the gravy was not that much good because spices were unable to enhance their flavour at low cooking time and in C₃ spices may get over heated and gave a slightly burnt taste to the gravy.

Sample D consists an increased amount of tomatoes, cashew nuts, cardamom, kanda-lasun masala powder, reduced amount of cumin seeds, doubled the amount of cinnamon. Sample A₂ scored highest for all the parameters. It gave good colour, flavour, and taste also. Sample D₁ and D₃ gave poor coloured gravy while sample D₂ showed a good colour, flavour and texture because sample D₁ showed poor results due to the low cooking time. In sample D₃ due to high cooking time the spices like cinnamon, cardamom and cumin seeds get over cooked and resulted in slightly burnt taste of gravy and darken the colour of the gravy.

Sample E was constituted of more amount cashew nuts, water, oil, onions, garam masala, coriander powder, green chilli paste and cumin seeds etc. The sensory evaluation of a sample made to known that sample E₁ showed light colour appearance due to the increased amount of cashew nuts and onions and it also affected the texture of gravy due to low cooking time and high amount onion. However, onion was rich in moisture and due low cooking time moisture was unable to evaporate. In sample E₃ due to the high cooking time garam masala and coriander powder it gave a slightly bitter taste and flavour of spices was not good. But sample E₂ produced a proper colour, flavour, texture, taste and overall acceptability score also too good for this sample.

By all of these trials, it was observed that the optimized cooking time for the Kolhapuri gravy was 10 mins. ashas impacted positively on each sample of the gravy.

Table 4: Effect of ingredients cooking time on sensory attributes of Kolhapuri gravy

Sr. No.	Sample Code	Cooking time (in Min.)	Sensory Attributes				
			Colour	Flavour	Texture	Taste	Overall acceptability
1	A ₁	5 mins.	6	7	7	8	7
	A ₂	10 mins.	8	9	8	9	9
	A ₃	15 mins.	5	8	6	7	7
2	B ₁	5 mins.	7	6	6	7	7
	B ₂	10 mins.	8	8	9	9	9
	B ₃	15 mins.	6	7	7	8	7
3	C ₁	5 mins.	7	6	7	7	7
	C ₂	10 mins.	8	8	9	9	9
	C ₃	15 mins.	6	5	7	8	7
4	D ₁	5 mins.	7	7	8	8	8
	D ₂	10 mins.	8	8	9	9	9
	D ₃	15 mins.	6	7	7	7	7
5	E ₁	5 mins.	6	7	8	7	7
	E ₂	10 mins.	8	9	9	9	9
	E ₃	15 mins.	7	6	7	6	7

Among all the five samples, sample E was selected by sensory evaluation which contains slight variations in the amount of ingredients used and cooking time of gravy. Sample A had more sour taste so I used

tomatoes by removing the seeds which helps to decrease the soury taste of gravy. Then in sample B, I used more amounts of cashew nuts to obtain the thickness of gravy. To enhance the taste of gravy, I increased the cooking time in each of the sample by 5 minutes and sample E gave a good taste and flavour which required 25 minutes for cooking. By taken the trials of these five samples of Kolhapuri gravy, sample E was selected for further processing.

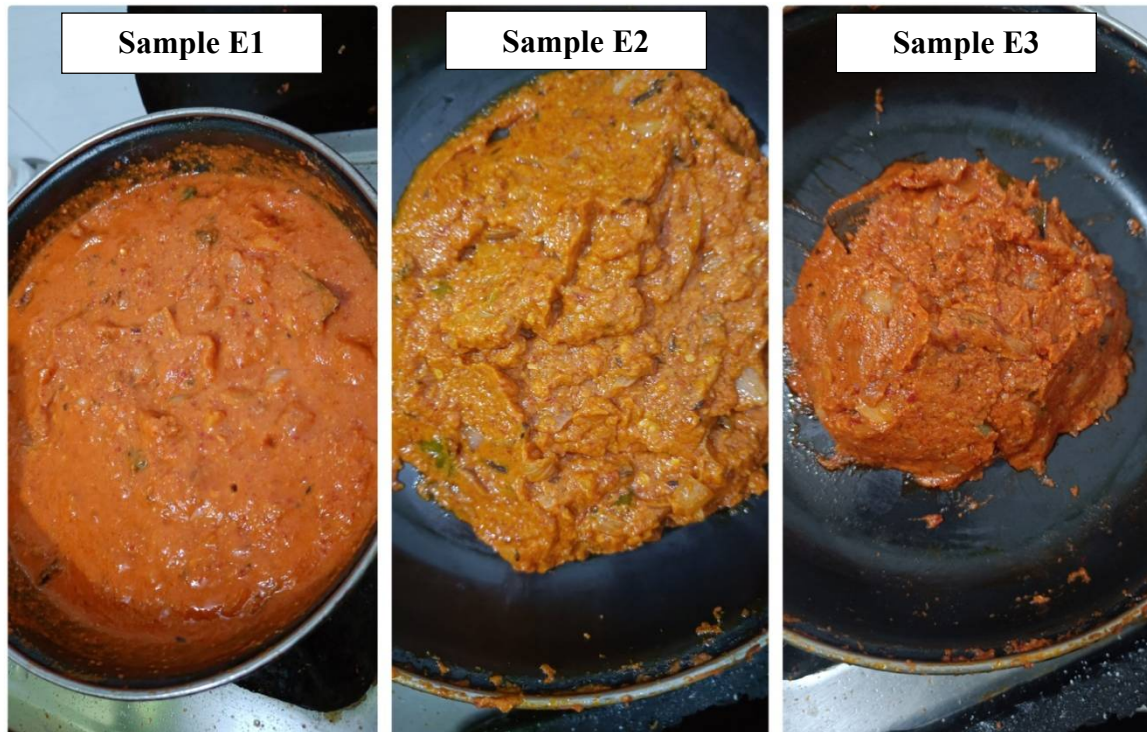


Figure 2: Effect of cooking time on yield of Kolhapuri gravy (Sample E)

Chemical analysis of selected Kolhapuri gravy (sample E₂)

Table 5 indicates that the prepared gravy was rich in protein i.e. 10% and it contains moisture 33.05%, carbohydrates 8%, fat 15%, crude fiber 7.09% and total minerals 5.5%. Hence the prepared Kolhapuri gravy can be used for the preparation of both vegetarian and non-vegetarian dishes. The gravy also showed a good energy value that was 178.63Kcal/100g of gravy.

Table 5: Chemical composition of Kolhapuri gravy (sample E₂)

Parameters	Amount
Moisture (%)	33.05
Ash (%)	5.5
Protein (%)	10
Fat (%)	15
Total carbohydrate (%)	8
Crude fibre (%)	7.09
Energy value (Kcal/ 100g)	178.63



Figure 3: Kolhapuri gravy (Sample E2) packed in glass jars

CONCLUSION

An attempt has been made for optimizing the process for preparation of the traditional Kolhapuri gravy, so that one can be able to relish the Kolhapuri flavour at any place at any time. Various formulations were tried in order to standardise the process and out of five formulations, sample E was selected based on the results of physical and sensory evaluation. All the ingredients used in the preparation of samples were analysed for chemical parameters to justify their role in providing the desired quality in the gravy. The cooking time for gravy was also optimized on the basis of sensory evaluation. It was evident from the results that, cooking of gravy for 10 mins was the optimal cookingtime. It has significant impact on the yield and sensory attributes of the final product. The chemical analysis of selected sample i.e. sample E₂ revealed that, the traditional Kolhapuri gravy beside its richness in flavour it was also rich in protein (10.00%), total minerals (5.50%) and crude fiber content (7.09%). Moisture content of the gravy (sample E₂) was 33.05%, which keeps the product in a category of intermediate moisture food. Using these research findings one can be able to promote the regional delicacies of Indian traditional food and standardise it's uniformity with respect to organoleptic attributes.

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