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Standardization, preparation and quality evaluation of turmeric soup

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Abstract
In the present investigation, the technology is developed to standardize the process for preparation of turmeric soup. The raw turmeric rhizomes and prepared soup were analyzed for physical, chemical and sensory properties. The raw turmeric were found to contained moisture 87.20 per cent, fat 1.08 per cent, protein 1.20 per cent, carbohydrate 9.10 per cent, ash 0.66 per cent and fiber 0.72 per cent. The curcumin content in raw turmeric rhizome was 5.30 per cent. The turmeric soup was prepared with incorporation of 10, 20 and 30 per cent turmeric pulp. The proximate composition of turmeric soup such as moisture, carbohydrate, protein, fat and ash were 87.64 per cent, 6.11 per cent, 4.65 per cent, 0.21 per cent and 1.39 per cent respectively. The sample S_2 (20 per cent turmeric pulp) was found to be organoleptically significant over other turmeric pulp added samples with 0.65 per cent curcumin content.

Keywords: Turmeric rhizome, Turmeric soup, Proximate composition, Curcumin content, Organoleptic characteristics.

Introduction
Turmeric is known as the “golden spice” as well as the “spice of life.” It has been used in India as a medicinal plant, and held sacred from time immemorial. In all South Asian countries, turmeric has been in use from ancient time as a spice, food preservative, coloring agent, and cosmetic and in the traditional systems of medicine (Ayurveda, Sidha, Unani and Tibetan).
Curcumin or diferuloylmethane with chemical formula of (1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5- dione) and other curcuminoids constitute the main phytochemicals of Curcuma longa L. (Zingiberaceae family) rhizome with the common name of turmeric (Ammon H. P. T. and Wahl M. A., 1991) [2].
Turmeric has potential benefits on cancer due to its photochemical content (Lin and Ke, 1998) [16]. Turmeric has anti-fungal and antibacterial properties; however, curcumin is one of them (Ragasa *et al*., 2005) [21]. Curcumin has been traditionally used as a good source of colouring matter for foods and as a medicinal ingredient in formulations of the several medicines for ailments from jaundice, other liver disorder, ulcers, parasitic infections, various skin diseases, sprains, inflammation of the joints, cold and flu (Anonymous, 1950) [3]. It possesses anti-inflammatory, hepatoprotective, antimicrobial, anticancer, antitumor, blood purifying, stomachic, antiseptic and anti-viral activities (Ghani, 2003) [13]. Curcumin also possesses the remarkable activities of preventing or treating alzheimer disease, immune modulation and correcting cystic fibrosis defects (Balasubramanian, 2006) [5].
Soup is primarily a liquid a heterogeneous food category food, predominantly served hot, which is prepared using vegetables or meat with stock, juice or water with some thickening agent. Soups are classified into two main groups: clear soup and thick soups. Clear soups are mainly prepared from the use of clear extracts of edible animal or plant parts while cereal or pulse flour, starch cream or eggs for the thick soup (Singh and Prasad, 2014) [23].
Increasing attentiveness of end users health and interest in nutritional foods to achieve a healthy lifestyle has resulted in the need for the development of food products with innovative and versatile health promoting characteristics (Das *et al*., 2011) [7]. In view of the therapeutic importance of Turmeric in the present investigation has been made to utilize of Turmeric rhizome in the new product development like turmeric soup to avoid tedious processing of fresh turmeric rhizomes to polished turmeric rhizomes.

Materials and methods
The present investigation was carried out in Department of Food Engineering, College of Food Technology, VNMKV, Parbhni. Fresh turmeric rhizomes of namely *Salem*, were collected from farm (near to Parbhani, Maharashtra). Other raw materials were procured from the local market of Parbhani.

Standardized recipe of turmeric soup

Table 1: Standard recipe for preparation vegetable soup (per lit.)

Ingredients	Amount(g)
Tomato puree	80
Grinded carrot	80
Chopped onion	60
Chopped spinach	60
Garlic and Ginger pest	40
Coriander	20
Black pepper powder	2
Cumin powder	2
Corn flour	6
Water	650 ml

Table 2: Formulation of soup with addition of turmeric pulp at different levels

Sample	Soup (ml)	Turmeric pulp (ml)
Control	100	-
S_1	90	10
S_2	80	20
S_3	70	30

From above table sample S_2 containing 20% turmeric pulp was organoleptically acceptable for further study.

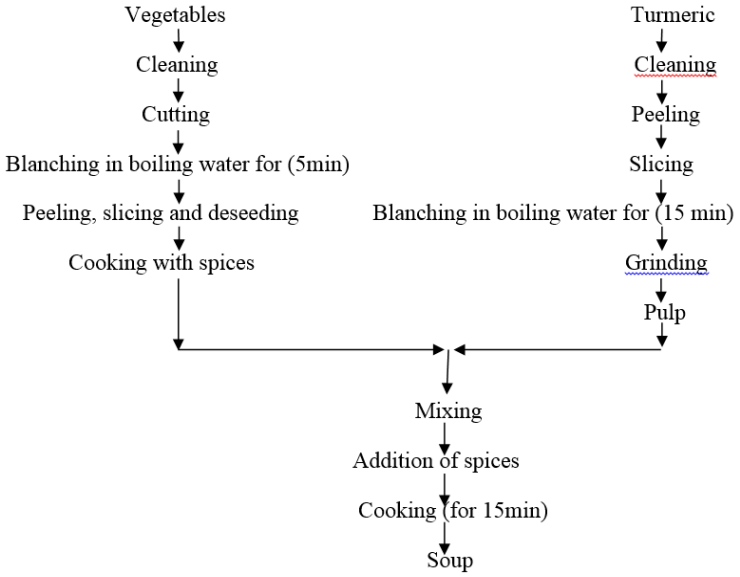

Fig 1: Flow sheet for preparation of soup with addition of turmeric pulp

Chemical characteristics of prepared turmeric soup

Proximate composition of prepared turmeric soup such as moisture, fat, protein, ash and carbohydrate were estimated according to the standards given by A.O.A.C. (1990) [1]. TSS was measured by using Abbe refractrometer and titratable acidity as per method given by Ranganna (1986) [22]. Curcumin content was determined by using solvent extraction method and it can be quantified with UV spectrophotometer (ASTA, 1958) [4].

Sensory evaluation of prepared turmeric soup samples

Sensory evaluations of turmeric soup were carried out on the basis of 9 point hedonic scale.

Statistical analysis

The data obtained was analyzed statistically by Completely Randomized Design (CRD) as per the procedure given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of $P< 0.05$ level, S.E. and C.D. at 5% level is mentioned wherever required.

Results and Discussion

Physical characteristics of fresh turmeric rhizomes

Physical characteristics of rhizome plays very important role in development of processing technology and on quality of final products. The data on physical characteristics of fresh turmeric rhizome of *Salem* variety is presented in table 3.

Table 3: Physical characteristics of fresh turmeric rhizomes

Variety	Colour	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (gm)	Peel (%)
Salem	Yellowish brown	9.84	2.83	2.60	74.80	8.70

*Each value is the average of three determinations

It could be revealed from table 3 that colour of fresh turmeric rhizome of Salem variety observed to be yellowish brown to deep brown in colour. The variation in colour was due to difference in curcumin content of rhizome. The similar results were shown by Parthasarathy *et al*., (2008) [19]. The content of curcumin depends on location of growth and type of cultivar. Curcumin is the component of turmeric responsible for its colour and all its medicinal properties.

The length and breadth of rhizome was found 9.84 cm and 2.83 cm respectively. The value shown for thickness of rhizomes was recorded 2.60 cm. However, the weight of rhizomes was recorded 70.84 g. The peel percentage was recorded to be 8.85 per cent.

Jaggi (2012) [14] reported the results on physical characteristics regarding length and breadth. Differences in physical properties were due to varietal differences and stage of

harvesting period. Colour parameters were in close agreement with those recorded by Dash *et al.,* (2014) for turmeric rhizomes.

Chemical characteristics of fresh turmeric rhizomes

The data pertaining to chemical characteristics of fresh turmeric rhizome of *Salem* variety was presented in table 4.

Table 4: Chemical characteristics of fresh turmeric rhizome

Chemical characteristics	Salem
Moisture (%)	87.20
Carbohydrate (%)	9.10
Fat (%)	1.08
Protein (%)	1.20
Ash (%)	0.66
Fiber (%)	0.72
Curcumin (d/b)(%)	5.30
T.S.S. (^{0}Brix)	9.0
pH	7.1
Titratable acidity (%)	0.64

*Each value is average of three determinations

The data in the table 4 showed that the moisture, carbohydrate, protein, fat and curcumin content were found to be 87.20, 9.10, 1.20, 1.08 and 5.30 (d.b.) per cent respectively. The results obtained are good in accordance with Mathai (1976) who reported the variability in turmeric (*Curcuma* species) germplasm for curcumin in freshly harvested mature rhizomes of 38 varieties representing *C. longa* and *C. aromatica*. The curcumin content ranged from 2.5 to 8.1 per cent. Variation in the chemical properties may be due to varietal differences and stage of harvesting period.

The ash and fiber of raw turmeric 0.66 and 0.72 per cent were obtained. The TSS, pH and acidity of fresh turmeric rhizomes was noted 9.0 ^{0}Brix, 7.1 and 0.64 per cent respectively. Dash *et al*., (2014) [8] also reported similar results for pH, Titratable acidity and TSS of matured turmeric.

Mineral content in fresh turmeric rhizomes

Minerals are inorganic elements needed by the body as structural component and regulators of body processes. The data with respect to zinc, calcium and iron in turmeric rhizome are presented in table.5.

Table 5: Mineral content in fresh turmeric rhizomes

Minerals	mg/100g
Zinc	22.7
Calcium	8.1
Iron	2.5

*Each value is an average of three determinations

The table 5 showed that the zinc content of turmeric rhizome was found to be highest (22.7 mg/100g) than the rest of other minerals; Zinc plays an important role in production, storage and regulation of insulin. Zinc levels tend to be low in diabetic patients as reported by Garg *et al.,* (2005) [12]. Moreover, calcium is the most common mineral in the human body and its role in the human body includes some beneficial effects on the prevention and treatment of bone diseases. The present investigation calcium content was found to be 8.1 mg/100g in turmeric rhizome.

The content of iron in turmeric rhizome was found 2.5 mg/100g. Iron is a strong pro-oxidant that catalyses several cellular reactions that result in the production of reactive oxygen species (ROS), with a consequent increase in the level of oxidative stress (Puntarulo, 2005) [20]. It is essential component because of iron deficiency is associated with development of severe anemia. Similar results were also reported by Trinidad *et al.,* (2012) [24]. The study showed that turmeric rhizome was good sources of iron, zinc and calcium. However, differences in their mineral availability for absorption were observed and may be due to its mineral content and/or mineral-mineral interaction (Cook *et al.,* 1991 and Davidsson *et al.,* 1994) [6], [10].

Organoleptic evaluation of prepared turmeric soup with incorporation of different level of turmeric pulp

The sensory evaluation of turmeric soup was carried out by semi trained panel and the score were given by evaluating colour, appearance, flavour, taste, consistency and overall acceptability which was compared with control sample and tabulated in Table 6.

Table 6: Organoleptic evaluation of prepared turmeric soup with incorporation of different level of turmeric pulp

Treatments	Parameters					
	Colour	Appearance	Taste	Flavour	Consistency	Overall acceptability
S_0	8.0	8.5	8.3	8.3	8.6	8.8
S_1	8.4	8.2	8.0	8.0	8.1	8.4
S_2	8.6	8.3	8.5	8.2	8.2	8.6
S_3	8.2	8.0	7.9	7.9	8.0	8.2
SE	0.0093	0.0236	0.0107	0.0145	0.0167	0.0241
CD@5	0.0282	0.0691	0.0313	0.425	0.0439	0.0706

*Each value is an average of ten determinations

S_0- Control sample without addition of turmeric pulp
S_1- With addition of turmeric pulp 10% in soup
S_2- With addition of turmeric pulp 20% in soup
S_3- With addition of turmeric pulp 30% in soup

The maximum score was recorded for control sample (8.8) followed by sample S_2 (8.6) which was higher than samples S_1 and S_3. It is evident from Table 6 that control sample of soup prepared without addition of turmeric pulp recorded the highest sensory score in all quality attributes as compared to turmeric soup incorporated with turmeric pulp.

Moreover among the all samples of turmeric soup prepared with turmeric pulp it is evident that the sample S_2 containing 20 per cent turmeric pulp reported the highest score (8.6) for overall acceptable whereas slight differences in sensory score was observed in sample S_1 and S_3. Sample S_3 containing 30 per cent turmeric pulp recorded (8.2) which was comparatively lower sensory score quality attributes as compare to other samples.

The result of Table 6 revealed that there was slight difference in colour of samples. Sample S_2 observed highest score (8.6) followed by S1 and S3 which was comparably lowest. Sample S3 scored lower (8.2) among all the samples, because higher amount of turmeric pulp shown undesirable colour to the

sample, which forces the panel members to rank lower. By comparing scores given by panel members it was clear that colour and appearance of turmeric soup depends on amount of turmeric pulp added to the soup.

Control sample scored higher for flavour followed by S_2 and S_1. Sample S_3 was found to be significantly inferior over all the samples, because addition of higher proportion of turmeric pulp had direct impact on the flavour of the sample. Thus increase in proportion above 20 percent was found undesirable by the panel members.

Taste of the samples significantly affected with addition of turmeric pulp. Control sample ranked higher followed by sample S_2, S_1 and S_3. Sample S_3 scored lowest having more turmeric pulp because its property of astringency which was unacceptable by panel members.

The sample S_2 containing 20 per cent turmeric pulp was found to be statistically significant over sample S3 containing 30 per cent turmeric pulp. However sample S_2 and S_1 are found to be statistically at par with each other in colour, flavour and taste except overall acceptability. The control sample without addition of turmeric pulp recorded the highest score in all the organoleptic attributes compared to other sample.

Considering all the above parameters the control sample found to be statistically significant over the all samples.

Chemical composition of selected turmeric soup sample (S_2)

On the basis of organoleptic evaluation, soup containing 20 per cent turmeric pulp was selected for further analysis. The data on proximate composition of turmeric soup such as moisture, fat, protein, carbohydrates and ash was carried out and the results obtained were tabulated in Table 7.

Table 7: Chemical composition of selected turmeric soup sample (S_2)

Parameters	Observations (%)
Carbohydrate	6.11
Protein	4.65
Fat	0.21
Ash	1.39
Moisture	87.64
Total Solids	12.36
Curcumin	0.65

*Each value is average of three determinations

It can be revealed from table 7 that values obtained for moisture, fat, protein, carbohydrates and ash were recorded to be 87.64, 0.21, 4.65, 6.11 and 1.39 per cent respectively. Turmeric soup found to contain highest amount of carbohydrate (6.11 per cent) than other parameter. Ash content of turmeric soup was found to be 1.39 per cent. Results for proximate composition of soup were supported by David and Kumar (2014) [9].

The recipe for preparation of turmeric soup was standardised with 20 per cent turmeric pulp that provide 0.65 per cent curcumin content in final product. Curcumin act as medicine for rheumatoid arthritis, chronic anterior uveitis, conjunctivitis, skin cancer, small pox, chicken pox, wound healing, urinary tract infections and liver ailments by Dixit *et al.*, (1988) [11].

Conclusion

From the present investigation, it can be concluded that prepared turmeric soup was considered as being tasty and nutritious. The sample S_2 was found more acceptable and it was superior over other samples with considerable amount of curcumin content i.e. 0.65 per cent. Turmeric soup is beneficial to the cancer patients with regards to its anti-cancer activity due to the presence of curcumin content.

References

1. A.O.A.C. 1990, Official Methods of Analysis. Trends in Food Science and Technology. Association of Official Analytical Chemists, Washington DC, USA.
2. Ammon HPT, Wahl MA, Pharmacology of *Curcuma longa*," Planta Medica, 1991; 57(1):1-7.
3. Anonymous, Wealth of India: A dictionary of Indian raw materials and industrial products (CSIR, New Delhi) 1950; 2:402-405.
4. ASTA, Official Analytical Methods; American spice Trade Association; Englewood cliffs, NJ, Methods (18) color power of Turmeric, 1958.
5. Balasubramanian K. Molecular orbital basis for yellow curry spice curcumina prevention of Alzheimer disease. Journal of Agricultural Food Chemistry, 2006; 54:3512-3520.
6. Cook JD, Dassenko SA, Whittaker P. Calcium supplementation effect on iron absorption. American Journal of Clinical Nutrition, 1991; 25(3):106-111.
7. Das A, Raychaudhuri U, Chakraborty R. Cereal based functional food of Indian subcontinent: a review. Journal of Food Science and Technology, 2011; 49(6):665-672.
8. Dash PK, Akhtar Afroza Md, Abdul Mannan. Physico-chemical characterization and product development from turmeric (Curcuma Longa) germplasm available in South Western Region of Bangladesh. International Journal of Biosciences. 2014 4(1):484-494.
9. David J, Kumar P. Utilization of *Chhana* Whey for Preparation of Vegetable Soup. *Trends in Biosciences*, 2014; 7(5):341-342.
10. Davidsson L, Kastenmayer P, Hurrell RF, Sodium iron EDTA as a food fortificant: the effect on the absorption and retention of zinc and calcium in women. American Journal of Clinical Nutrition, 1994; 60:231-237.
11. Dixit VP, Jain P, Joshi SC. Hypolipidaemic effects of Curcuma longa L. and Nardostachysjatamansi, DC in triton-induced hyperlipidaemic rats. Indian Journal Physiology and Pharmacology, 1988; 32:299-304.
12. Garg AN, Kumar A, Maheshwari G, Sharma S. Isotope dilution analysis for the determination of zinc in blood samples of diabetic patients. Journal of Radioanalytical and Nuclear Chemistry, 2005; 2(63):39-43.
13. Ghani A. Medicinal plants of Bangladesh: Chemical constituents and uses. 2nd Ed., (Revised and Enlarged). Asiatic Society of Bangladesh, old Nimtali, Dhaka. 2003, 196-197.
14. Jaggi Lal Turmeric, Curcumin and Our Life: A Review: Bulletin of Environment, Pharmacology and Life Sciences, 2012; 1(7):11-17.
15. Kim MH, Toledo RT, Effect of osmotic dehydration and high temperature fluidized bed drying on properties of dehydrated Rabbit-eye Blue berries. Journal of Food Science, 1987; 52(4):980-984.
16. Lin LI, Ke YF, Curcumin inhibits SK-Hep-1 hepatocellular carcinoma cell invasion in vitro and suppresses matrix metalloproteinase-9 secretion. Oncology, 1998; 55:349-353.
17. Mathai CK, Variability in Turmeric (*Curcuma* species) Germplasm for Essential Oil and Curcumin. Qualitas-Plantarum, 1976; 25:227-230.

18. Panse VG, Sukhatme PV, Statistical methods for agricultural workers, I.C.A.R., New Delhi. 1967, 361.
19. Parthasarathy VA, Chempakam B, Zachariah TJ, Chemistry of Spices. Centre for Agriculture and Bioscience International (CABI): Wallingford, USA, 2008.
20. Puntarulo S, Iron, oxidative stress and human health. Molecular Aspects of Medicine, 2005; 26:299-312.
21. Ragasa C, Laguardia M, Rideout J. Antimicrobial sesquiterpenoids and diarylheptanoid from Curcuma domestica. ACGC Chemical Research Community, 2005; 18(1):21-24.
22. Ranganna S, Handbook of analysis and quality control for fruit and vegetable products. Tata Mc Graw- Hill, New Delhi. 1986, 1-201.
23. Singh Y, Prasad K. Multivariate classification of promising paddy cultivars on the basis of physical properties. Pertanika Journal of Tropical Agriculture Science. 2014; 37:327-342.
24. Trinidad P, Rosario S, Sagum, Marco P, de Leon, Aida C *et al.* Zingiber Officinale and Curcuma Longa as Potential Functional Foods/Ingredients, Food and Public Health, 2012; 2(2):1-4.