



STANDARDIZATION OF INNOVATIVE SALUBRIOUS INDIAN CURRY POWDER USING BEETROOT (READY TO USE MIX)

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Article history:	Abstract:
<p>Received: 24th October 2021 Accepted: 24th November 2021 Published: 30th December 2021</p>	<p>Curry powder is a popular spice mix Indian cuisine is famous all around the world for its great taste, colors and aromatic spices. Indian cuisines also enjoy the enviable reputation of being healthy and unique in taste, thus these are the contributions of spices too. All the spices have their own benefits which they provide to the human health. Spices improve blood cholesterol; promote weight loss and fat reduction. Mint also helps relieve indigestion, subjectively improves cold symptoms etc. Beetroot is an excellent source of antioxidants, phytochemical compounds like phenolic, flavonoid and micronutrients including sodium, magnesium, vitamin C, potassium and nitrate. The colour pigments present in the beetroot have potential capabilities. The composition of beetroot has numerous high health benefits like anti-inflammatory, hepato-protective, and chemo preventive properties. However, most of the people did not like to consume fresh beetroot because of its taste. So, production of beetroot curry powder with addition of onion, coriander, garlic, ginger, cumin, asafoetida, turmeric, dried mango powder, black pepper and mint was developed with the objective that it can meet good demands and can increase beetroot powder acceptability by the consumers. On the basis of the result obtained during the study, it is concluded that the beetroot powder & onion powder can be successfully employed for the preparation of curry powder incorporation with other spices. The data obtained on various sensory & chemical parameters were statistically analyzed. Chemical evaluation show the curry powder prepared by using beetroot powder & onion powder T₂ (BP-70: OP-30) was found to be more acceptable because of higher sensory appeal as well as it scored maximum for nutritional profile.</p>

Keywords: Curry, Powder, Mix, Beetroot Powder, Onion, Powder, Mint, Indian Curry.

INTRODUCTION

Curry powder: Curry powder is the prime product of those blends or mixes & occasionally consists of twenty or more spices intended to impart the characteristic flavour of an Indian curry which is relished across the globe. While freshly ground masala's (mixed curry spices), owing to the shortage of domestic labour and scarcity of time in today's world there is a definite trend today towards using spices mainly in powdered & packaged, ready to use form in many combinations of curry powders. Each curry powder can have different component spices, in different amounts-making each curry blend unique. Curry powder is one of a number of mixtures of spices used in Indian cooking and (unsurprisingly) is specifically used for curry dishes.

Beetroot: Beetroot, a cultivated form of *Beta vulgaris L.* is a vegetable of chenopodiaceae family. The bright crimson colour beetroot is known as chukander in hindi. Beetroot also regarded as "Super Food" plays an important role both for the growth and development of human body. (Singh *et al.*, 2013 and Kumar, 2015). The main significance of beetroot is that it has a low fat content and high source of fiber. Beetroot contains water-soluble nitrogen containing pigments called betalains with potent biological activities, including antioxidant, anti-inflammatory, hepatoprotective, and chemo preventive (Georgiev *et al.*, 2010). Beetroot helps in lowering the blood pressure (Coles and Peter, 2012). As high source of nitrate, it has important implications for managing cardiovascular health (Lunberget *et al.*, 2011). In addition, beetroot can also stabilize the glucose level in blood due to presence of soluble fibers. Consumption of beetroot helps in weight loss and help to clean the toxic and excess water from the body. Consumption and use of beetroot as such or in product formulation help in combating malnutrition and nutrient deficiency. According to the USDA Nutrient Database, the nutritional value of fresh beetroot per 100 g is ; moisture-

87 g Carbohydrates-9.96g (sugar-7.96g, dietary fiber-2.0), fat-0.18g, protein-1.68g, vitamin C- 3.6mg, calcium-16g, iron-0.79, magnesium-23mg, phosphorus 38mg, potassium-305mg, zinc- 0.38mg and sodium -77mg.(Kumar 2015) Nutrient composition of beetroot powder per 100g: Energy-328.50 Kcal,moisture-4.6 g, Protein-1.0 g, Carbohydrate-89 g, (sugar-18.8g, Crude fiber-6.20 g),Iron-6.6 mg, Fat-1 g, Potassium-1.90 g, Sodium-639 mg, calcium133 mg (USDA-food central data base)

Onion:Onion (*Allium cepa* L.) is one of the major vegetable crops grown in Europe since 1998 (Roldanet *al.*, 2007). Onion provides unique flavour and health enhancing properties as it possess organo sulfur compounds and carbohydrates. Beyond the nutritional benefits, it has the ability to reduce the blood lipids, cholesterol and decreased risk of cardiovascular diseases (Garmarini *et al.*, 2001).Onion powder is a seasoning widely used when the fresh ingredient is not available. It is prepared from finely ground, dehydrated onions, chiefly the pungent varieties of onion bulbs, and has a powerful odour. Being dehydrated, it has a long shelf life and is available in several varieties: yellow, red, and white. **Nutrient composition of onion powder per 100g:** Energy-341Kcal, moisture-5.39g, Protein-10.41g, Total Lipid (Fat)-1.04g, Carbohydrate-79.12g (Fiber- 15.2g, sugar -6.63g) Ash-4.04g (USDA-food central data base)

Spices: Spices and herbs are commonly used as a food and to treat ailments. They have medicinal properties that alleviate symptoms or prevent diseases. Addition of spices in food can helps in enhancing the taste, flavor and aroma of the food product. **Turmeric** is a primeval spice, a inhabitant of South East Asia, used from ancient times as dye and a condiment. **Mango (*Mangifera indica* L.)** is one of the most appreciated fruits in the world. **Coriander (*Coriandrum sativa* L.)** is an important medicinal spice crop native to Mediterranean region. In India, corianders are highly produced and are widely used in different various food applications (Rathore *et al.*, 2013). It possesses natural phytochemical so that it has antioxidant effects, anticancer, stimulation of immune system, helping digestion and helps in improve other several disorders. **Ginger (*Zingiber officinale*)**, a member of the tropical and subtropical Zingiberaceae, is widely used around the world in foods as spice, and extensively used in Traditional Chinese Medicine to treat headaches, nausea and colds. In Chinese, Ayurvedic and Western, the ginger also was applied in the treatment of arthritis, rheumatic disorders and muscular discomfort (Dedov *et al.*, 2002; Wang and Wang, 2005; Tapsell *et al.*, 2006).**Mint (*Mentha piperita* L.)** is one of the popular high medicinal herb native to Europe, USA, and Canada. Recently, it is widely cultivated in many parts of World. (Mckey *et al.*, 2006).**Cumin (*Cuminum cyminum* L.)** is one of the beneficial seed spice which are widely used in food industries. As cumin has anti-inflammatory, carminative and antispasmodics, it is used to treat jaundice, flatulence, diarrhea and indigestion (Rathore *et al.*, 2013). **Asafoetida (*Ferula assa-foetida*)** is an oleo-gum obtained from the roots of the Iranian endemic medicinal plant (Iranshahy *et al.*, 2010). Traditionally, it is used to treat various diseases like intestinal parasites, asthma, gastrointestinal disorders etc. Furthermore, it has possesses anti-inflammatory, anti-diabetic and anti-viral properties (Srinivasan, 2005).**Garlic (*Allium sativa*L.)** is a very useful vegetable spice which is used as folk medicines for treat of various diseases. It is grown in all over the world and widely used for different purposes in food Industries. It also contained various minerals like K, P, Mg, Ca, Na, Fe etc. (Haciseferogullari *et al.*,2014). **Black pepper (*Piper nigrum*)** is chiefly used amongst spices, worth of its characteristic sharp & stinging taste, flavour & smell. It belongs to the family Piperaceae, cultivated for its fruit (berries) that are usually dried and used as a spice and seasoning. Black pepper is native to Southern India and is extensively cultivated in this tropical region.It has an impressive antioxidant and antibacterial effect and helps with digestion and weight loss because it stimulates the breakdown of fat cells.

Therefore, the present study is an approach to utilize beetroot as a value added product by blending it with various spices to increase its acceptability and consumability.

MATERIALS AND METHOD

The experiment "preparation of curry powder from a mixture of beetroot powder and onion powder" which was prepared using beetroot powder, onion powder, garlic, cumin, mint, asafoetida, coriander powder, ginger, turmeric, dried mango powder and black pepper in the research lab of "Warner College of Dairy Technology" SHUATS, Prayagraj, 211007.

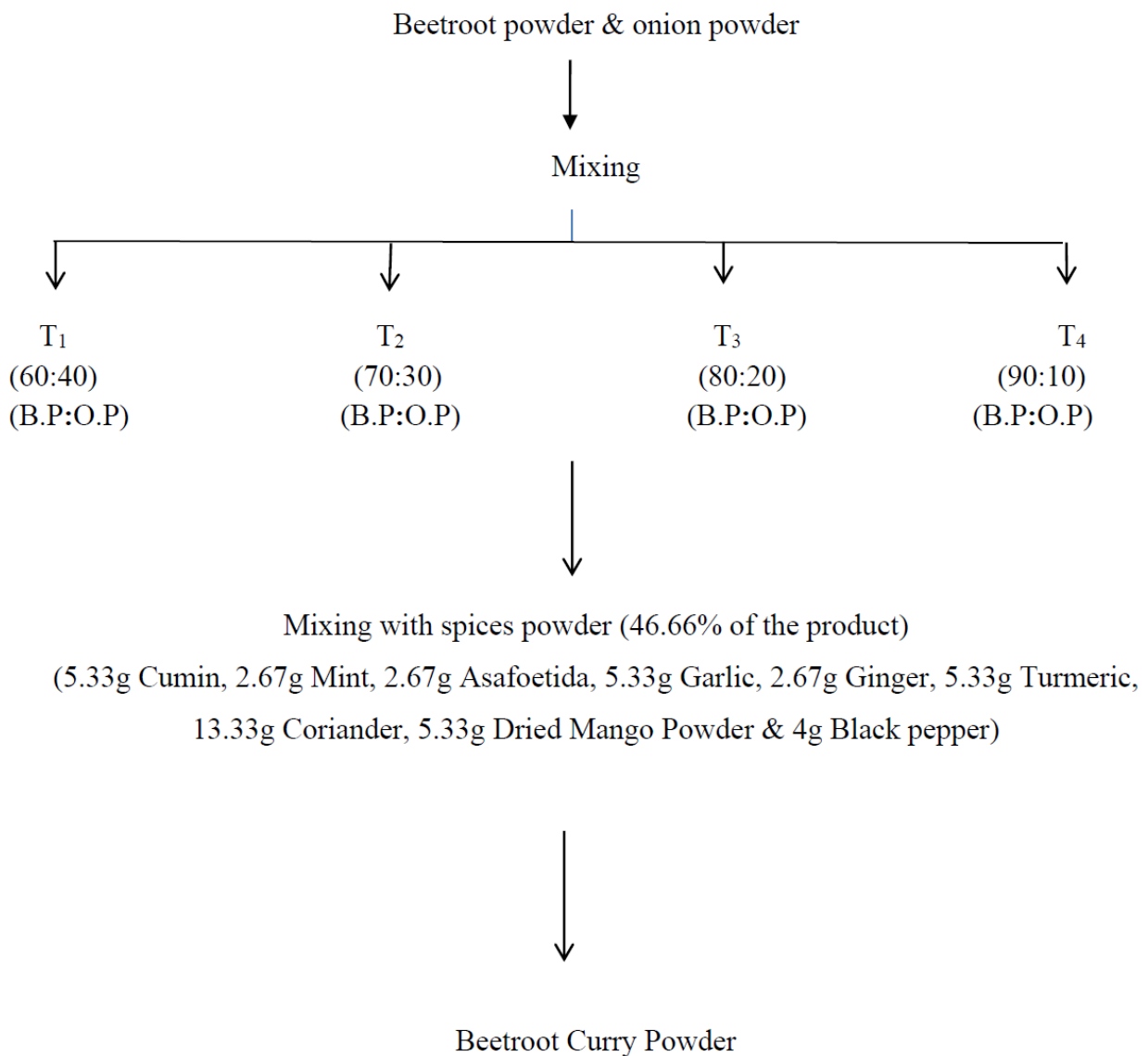
FLOW CHART OF BEETROOT POWDER

Raw Beetroot → Peeling → Washing → Steaming (20 Min at 100 °c) → Slicing (2/3 inch diameter & 2 mm thickness) → Drying (Convection tray dryer at 65-80 °c for 25hr) → Grinding → Beetroot Powder

FLOW CHART FOR ONION POWDER

Onion → Peeling → Blanching (2min at 95 °c) → Slicing (2/3 inch diameter & 2mm thickness) → Drying (Convection tray dryer at 65-80 °c for 9hr) → Grinding → Onion powder

3.3 FLOW CHART OF BEETROOT CURRY POWDER



NOTE: BP= Beetroot powder
OP= Onion powder

Average data for different parameters of experiments (in percent)

Parameters	Treatments			
	T ₁	T ₂	T ₃	T ₄
1. Chemical Analysis				
Carbohydrate	75.94	75.81	75.75	75.72
Protein	12.15	12.32	12.41	12.63
Fat	4.23	4.18	4.10	3.96
Ash	3.23	3.15	3.07	2.96
T.S	95.55	95.46	95.33	95.27
Moisture	4.45	4.54	4.67	4.73
2. Microbiological analysis				
Yeast & Moulds count (cfu/gm)	1.40	2.20	1.40	2.00
Coliform count	Nil	Nil	Nil	Nil
SPC × 10 ⁻³ (colony forming unit /gm)	4.00	4.00	3.80	4.00
3. Organoleptic Score (9- point hedonic scale)				
Color and Appearance	8.39	8.67	7.99	7.65
Flavor and taste	8.30	8.70	7.64	7.46
Body and Texture	8.35	8.82	7.54	7.12
Overall acceptability	8.35	8.73	7.72	7.41
4. Cost analysis				
Cost in Rs./100g	14.54	14.56	14.59	14.62

5.1 The different parameter of experimental curry powder from a mixture of beetroot powder and onion powder.

5.1 (a): Chemical parameters of curry powder from a mixture of beetroot powder and onion powder. Carbohydrate

The highest mean carbohydrate percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₁ (75.94), T₂ (75.81), T₃ (75.75) followed by T₄ (75.72). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Protein

The highest mean protein percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₄ (12.63), T₃ (12.41), T₂ (12.32) followed by T₁ (12.15). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Fat

The highest mean fat percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₁ (4.23), T₂ (4.18), T₃ (4.10) followed by T₄ (3.96). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Ash

The highest mean ash percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₁ (3.23), T₂ (3.15), T₃ (3.07) followed by T₄ (2.94). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Total Solid

The highest mean TS percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₁ (95.55), T₂ (95.46), T₃ (95.33) followed by T₄ (95.27). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Moisture

The highest mean moisture percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₄ (4.73), T₃ (4.67), T₂ (4.54) followed by T₁ (4.45). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

5.1 (b): Organoleptic parameters of curry powder from a mixture of beetroot powder and onion powder.

Color & Appearance

The highest mean color & appearance percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₂ (8.67), T₁ (8.39), T₃ (7.99) followed by T₄ (7.65). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Flavor & Taste

The highest mean flavor & taste percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₂ (8.70), T₁ (8.30), T₃ (7.64) followed by T₄ (7.46). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Body & Texture

The highest mean body & texture percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₂ (8.82), T₁ (8.35), T₃ (7.54) followed by T₄ (7.12). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

Overall Acceptability

The highest mean overall acceptability percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₂ (8.73), T₁ (8.35), T₃ (7.72) followed by T₄ (7.41). There was significant difference between all the treatments which may be ascribed by the different level of curry powder.

5.1 (c): Microbial parameters of curry powder from a mixture of beetroot powder and onion powder.

S.P.C ($\times 10^3$ cfu/gm)

The highest mean SPC percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₁ (4.00), T₂ (4.00), T₄ (4.00) followed by T₃ (3.80). There was non-significant difference between all the treatments which may be ascribed by the different level of curry powder.

Coli form ($\times 10^2$ cfu/gm)

It is evident from the experiment that the coli form test in experimental curry powder samples were 100 percentages negative.

Yeast & Mould ($\times 10^1$ cfu/gm)

The highest mean yeast & mould percentage was recorded in the curry powder from a mixture of beetroot powder and onion powder sample of T₂ (2.20), T₄ (2.00), T₁ (1.40) followed by T₃ (1.40). There was non-significant difference between all the treatments which may be ascribed by the different level of curry powder.

CONCLUSION

On the basis of the result obtained during the study, it is concluded that the beetroot powder & onion powder can be successfully employed for the preparation of curry powder incorporation with other spices such as cumin, mint, garlic, coriander, turmeric, Asafoetida, ginger, dried mango powder & black pepper. Beetroot is an excellent source of antioxidants, phytochemical compounds like phenolic, flavonoid and micronutrients including sodium, magnesium, vitamin C, potassium, nitrate, protein, fat etc. The composition of beetroot has numerous high health benefits like anti-inflammatory, hepato-protective, and chemo preventive properties. The data obtained on various parameters were statistically analyzed. Chemical evaluation show the curry powder prepared by using beetroot powder & onion powder T₂ (Treatment 2) (70:30) was found to be more acceptable because of higher nutritional profile as well as it scored maximum for all the sensory appeal.

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