



# Utilization of Tomato Powder as a Technological Functional Ingredient in Bakery Products: A Review

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

The present review aimed to investigate and analyze the use of Tomato powder as a fortification ingredient in different types of bakery foods. Tomatoes are known to be a rich source of vitamins, minerals and carotenoids, especially vitamin C, phosphorus, potassium, and lycopene, citric acid and malic acid it may become an ideal addition to different types of processed foods. drying as a preservation process is considered one of the best methods, because it ensures ease of use, transportation and storage. Tomato powder has a wide range of applications in the food and beverage industry due to its rich flavoring quality. The nutritional quality of bakery products keeps on degrading from the process of baking, packaging, transportation and storage. Tomato powder lowered the pH values of batters, but had no impact on pH or cooking losses of the products. It is a good source of various macro and micro mineral elements. One hundred grams of tomato powder

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provides between 5.81-74.82% and 6.39-87.00% of the daily recommended intake for different macro and micro mineral elements for Indian male and female, respectively. Main purpose of value added products is to minimize the qualitative and quantitative deterioration of the produce after harvest. Moreover, some of these dehydrated powder products are gaining popularity in the foreign market and are good foreign exchange earners. In India only 2.2% of the total produce is processed as compared to 40 to 83% in developed countries.

**Keywords:** Tomato; tomato powder; bakery product; functional ingredient.

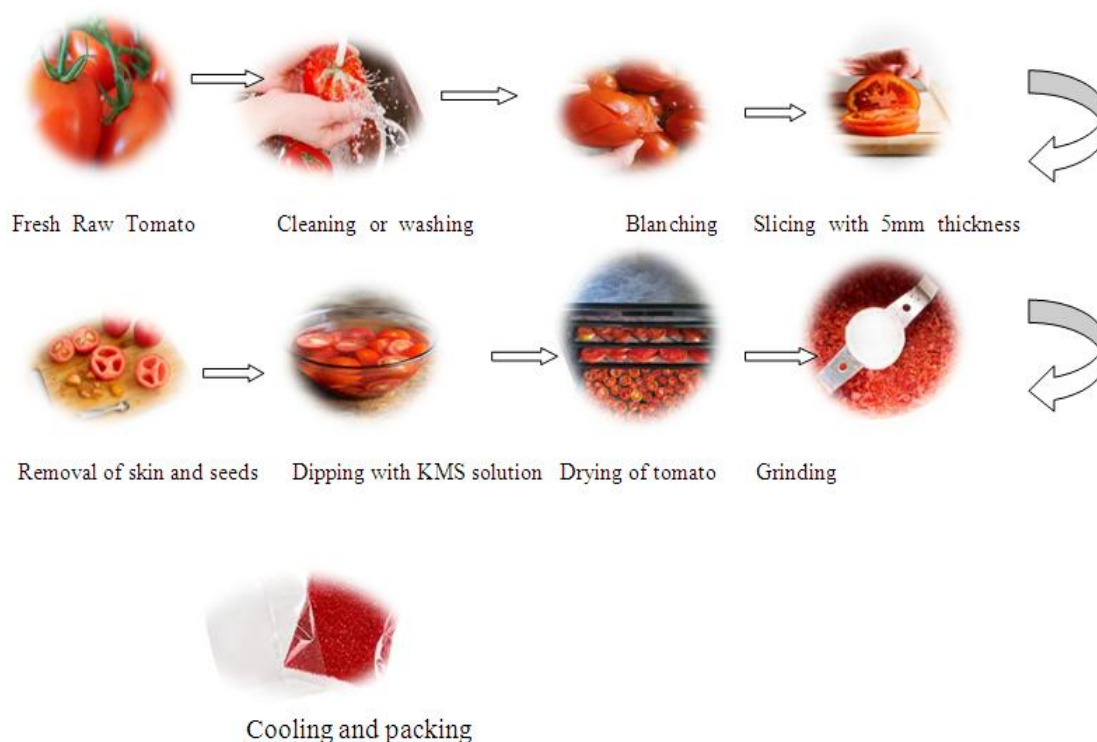
## 1. INTRODUCTION

Tomatoes (*Solanum lycopersicum*) are a widely used and versatile fruit and third vegetable next to potato and sweet potato in consumption its consumed fresh as well as in processed products because they are rich in several nutrients including vitamin A, vitamin C, potassium, calcium and lycopene [1]. Tomatoes are seasonal fruit consumed in fresh or processed forms, such as juice, soup, puree, ketchup, and paste [2]. The main antioxidants in tomatoes are carotenoids, ascorbic acid and phenolic compounds [3]. "The demand for foods that offer health benefits beyond basic nutrition as increased to a large extent among the consumers. It necessitates the formulation of food products that have health promoting effects like antioxidant, anti-cancerous, anti-inflammatory and anti-diabetic properties. When there is seasonal glut farmer doesn't fetch good price moreover a big share of crop produce is spoiled and become a waste due to lack of proper processing and storage. However, it can be processed to value added products. Tomato powder is readily marketable due to easy in packaging, transportation, utilization and extended storage life. Foods with such attributes may also be used as an alternative to dietary supplements in terms of safety, consumption, delivery and effectiveness of bioactive compounds in vivo" [4]. "Successful incorporation of Tomato powder into bakery products that deliver physiologically active components represents a major opportunity for food processors providing the consumer a healthy wheat based product to choose from which is currently lacking in the marketplace. Drying offers significant weight and volume savings, minimizing packaging and transportation costs and enabling storage of the product at ambient temperature" (Cuq, B.; Rondet, E 2010). "Drying

is also another way of extending the postharvest shelf life of tomato. Pizza, diverse veggies, and spicy recipes all use dried tomato products as significant ingredients" [5]. "Dehydrated food saves 86% of costs incurred in shipping, 77% in storage space and 82% in handling cost" [6]. "Tomato is one of the most cultivated vegetables" (Fernanda Dias Silva 2022). The basic principle reason is that microorganisms such as bacteria, fungi, mold required water for their growth and multiplication, which causes food spoilage and decay. The review gives a clear overview of possibilities and limitations, which can help the future experiments to support the utilization of tomato powder on a higher level. To better determine the role of tomato powder in different food applications, additional information on quality characteristics and nutrient composition especially vitamin C, lycopene content and minerals are required.

## 2. PREPARATION OF TOMATO POWDER

"Drying is the oldest method of food preservation. Tomato powder is produced from tomatoes subjected to drying and grinding, while lycopene itself might be obtained from waste material, such as tomato peel or seeds, or using chemical and microbial syntheses" [7]. The tomatoes were cleaned or washed with running water and were blanched then sliced. The tomato slices were spread on aluminum foil-covered trays and kept in cabinet dryer. They were then dried in a cabinet dryer (Mac Pharmatech, Nashik, India) at 60°C for 12 hours and ground to powder in a commercial mixer grinder (Prestige Stylo Mixer Grinder; Prestige, Bangalore, India). The powder was sieved through a BS-60 mesh to obtain particles <0.250 mm in diameter and stored in a freezer at -20°C The powdered tomato samples were packed in LDPE pouches and then stored at room temperature until analysis.



**Fig. 1. Preparation of tomato powder by cabinet dryer**

**3. PROXIMATE AND CHEMICAL COMPOSITION OF TOMATO POWDER**

173 mg, calcium 80 mg, magnesium 126 mg, Zinc 2.71 mg, copper 0.876 mg, manganese 1.83 mg, sodium 121.60 mg and potassium 2805.8 mg per 100 g” [8]. As shown in Table 1.

“Tomato powder contain vitamin C 125 mg, lycopene 1.41 mg, iron 3.99 mg, phosphorus

**Table 1. Chemical composition of tomato powder**

<b>Mineral</b>	<b>Tomato powder (mg/100g)</b>	<b>USDA values (mg/100g)</b>
Moisture (%)	5-60	3.9
Aash (%)	7.3	8.91
Vitamin C	125.00	116
Lycopene	1.41	-
Iron	3.99±0.32	4.56
Calcium	80.0±1.00	166
Phosphorus	173±2.08	295
Magnisium	126±0.15	178
Copper	0.876 ±0.80	1.24
Zinc	2.71±0.05	1.71
Maganese	1.83 ± 0.53	1.95
Sodium	121.60 ± 1.49	134.00
Potassium	2805.8± 21.41	1927.00

Source: <http://ndb.nal.usda.gov/ndb/search/list>

#### 4. BAKERY PRODUCTS

Bakery products contain high amount of fats and oils which oxidize slowly during storage leading to rancidity and deterioration of sensory attributes of the product. However, the auto-oxidation of fats or oils in these products can be prevented by using antioxidants. The use of natural antioxidants derived from plants has received much attention in recent years [9] due to the toxicity associated with the use of synthetic antioxidants such as butylated hydroxy anisole and butylated hydroxy toluene [10]. "Tomato powder and its extract can be used as a source of natural antioxidants in bakery products to prolong their shelf life as well as to increase their nutritional quality" [11]. "In Cookies are widely consumed baked products which can be served from breakfast to bedtime Recently, increasing consumer demand for healthier foods has triggered the development of cookies made with natural ingredients exhibiting functional properties and providing specific health benefits beyond those to be gained from traditional nutrients. The incorporation of tomato powder in cookies lowered the lightness values but increased redness and yellowness values. Cookies with up to 10.0% added tomato powder would be as acceptable as control cookies without depressing cookie quality [12]. "In cakes are one of many favoured baking products whose properties can be easily improved by incorporating various kinds of food ingredients using sponge cakes incorporated with tomato powder, a healthy and beneficial food ingredient, as a model system. Tomato powder was incorporated into cake batter at four different amounts (0%, 10%, 20%) and 30%, w/w) by replacing equivalent amount of wheat flour. The physicochemical properties of cakes as influenced by tomato powder sub situation. Specific volume decreased with the increase in the tomato powder substitution, though not significantly ( $p>0.05$ ). Incorporation of 10% tomato powder in the formulation of sponge cakes would be recommended while taking advantages of the health benefits of tomatoes without sacrificing the quality acceptance by the consumers" [13]. "In Dhokla is easy to cook and very popular as a snack. Dhokla is a lactic acid-fermented cake prepared from a batter of coarsely ground rice (*Oryza sativa* L.) which is fermented at ambient temperature, steamed in a dish, cut and seasoned It has an appealing mildly sour taste, colour, flavour and spongy texture and is a source of energy and nutrients" (Moktan B et al 2017).The addition of 1%, 4% and 7%

tomato powder had a significant impact on the physicochemical, nutritional and sensory properties of dhokla made with semolina and Bengal gram. The incorporation of tomato powder increased the acidity of dhokla from 0.09 to 0.45, while the carbohydrate, protein and ash content increased from 19.32% to 24.33%, 8.75% to 30.51%, and 1.07% to 1.98%, respectively. Antioxidant activity was increased following tomato powder incorporation. Vitamin C, phenolic and flavonoid content increased from 8.26% to 30.22%, 2.34% to 7.57%, and 0.2% to 0.77%, respectively [14].

#### 5. CONCLUSION

Tomato powder is the most effective technique to store dehydrated tomatoes. Tomato powder is a unique option for tomato juice, while tomato sauce and paste provide flavor to recipes. The increased demand for natural ingredients in food and beverages is driving the market expansion of tomato powder. Furthermore, the expansion of application markets such as infant nutrition, bakery and confectionery, beverages, and convenience food items is driving market growth. Furthermore, dried tomato powder has a longer shelf life than fresh tomatoes, thus it is becoming popular as a suitable substitute for fresh tomatoes. Fortified product adjustments will undoubtedly be required because sensory qualities have a significant impact in product adoption by a larger number of consumers. Hardness of the freshly prepared cookies was observed in the range of 17.16–43.78 N. It increased significantly ( $p < 0.05$ ) after the addition of tomato powder and crude lycopene Naseer Ahmad Bhat [15], [16-18].

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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