

Estimation of phytochemicals, antioxidants and cur cumin content in two selected turmeric powder.

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Abstract

Turmeric is a prompt source of bioactive compounds like antioxidants, polyphenols and flavonoids, which may be the substitute of antibiotics used in food and food products. The researcher study the antioxidant activity, phytochemical and cur cumin compounds of traditional medicinal turmeric associated with anti-cancer. Scientists believe that the active ingredient of turmeric, cur cumin act as antioxidants and thus help in fighting free radicals which causes cell damage. Turmeric also prevent metastasis spread of cancer throughout the body. The present study indicated the phytochemical, antioxidant, and cur cumin content of two various turmeric powder, among the two samples the homemade turmeric powder was found superior in tested parameters. Vitamin E is well known for its antioxidant properties, turmeric has 5 to 8 times stronger antioxidant of Vitamin E and C in it .Turmeric found to be very effective against one of the most reactive free radical hydroxyl radical. Studies of various author also revealed that cur cumin can help to prevent metastasis and this is a profound revelation in cancer treatment. Indian medicine uses turmeric powder for the treatment of biliary disorders anorexia, cough, and diabetic wounds hepatic disorders. (R.Arutselvi, et al. 2012). Turmeric is an important food preparations preservative that preserves freshness and gives a found to be a rich source of phenolic compounds vizcurcuminoids. (Rajesh. H, et al. 2013).

Key words : Phytochemicals, antioxidant , metastasis, cur cumin phenolic compound, vitamin E and C.

INTRODUCTION

“Live life with a little golden spice turmeric”.

Turmeric, a member of the family zingiberaceae has long been extensively used to prevent and cure human diseases for thousands of years in many oriental counties because of its low toxicity and effective therapeutically performance. Turmeric has been put to use as a food stuff, cosmetic, and medicine. Turmeric is also used in manufactured food products such as canned beverages, dairy products backed products like Ice cream, yellow cakes, orange juice, biscuits, Popcorn, Sweets, Cake icings, Cereals. It is a significant ingredient in most commercial curry powders. Turmeric is used as an herbal Medicine for acute andchronic diseases.

The present work has been performed to study the phytochemical parameters, which could serve as a measure of authentication among the two analyzed samples such as homemade turmeric and commercially packed turmeric powder. The continuing research indicates that turmeric and its active principle curcumin have unique anti-oxidant, anti-mutagenic, anti-tumorigenic and anti-carcinogenic, anti-inflammatory anti-microbial and hypocholesterolemic properties as reviewed elsewhere.

Turmeric has anti-oxidant, anti-inflammatory, anti-viral and anti-fungal actions. The most important compounds responsible, for the anti-oxidant activity of turmeric are phenolic compounds such as curcuma.

According to world Health Organization Medicinal plants would be the best source to obtain a variety of drugs about 80% of individuals from developed countries use traditional Medicine which has compounds derived from Medicinal plants. Turmeric is a Medicinal plant extensively used in Ayurveda, Unani and siddha medicine as home remedy for various diseases. Indian medicine uses turmeric powder for the treatment of biliary disorders anorexia, cough,diabetic wounds hepatic disorders. (R.Arutselvi, et al. 2012).

In the country like India every kitchen has one of spices named haldi without it food remains incomplete. Turmeric is an important food preparations preservative that preserves freshness and gives a characteristic flavors. Curcuma rhizomes have a characteristic dark yellow color and it has been found to be a rich source of phenolic compounds andscurcuminoids..

Nowadays, multiple drug resistance has developed due to the indiscriminate use of the commercial antimicrobial drugs commonly used in the treatment of infectious disease. Phytochemical analysis of both turmeric samples of homemade powder and commercially packed powder indicated the presence of flavonoids, saponins, tannins and phenols. . Turmeric is a prompt source of bioactive compounds like antioxidants, polyphenols and flavonoids, which may be the substitute of antibiotics used in food and food products.

Antioxidants in the form of commercial food additives have been manufactured synthetically and may contain high amounts of preservatives. Some synthetic antioxidants such as butylatedhydroxyanisole, butylatedhydroxytoluene, and tertiary butyl hydroquinone, have been reported to produce toxins or act as carcinogens. Therefore identifying potential natural antioxidant sources can be a useful alternative to ensure sound health. As a result, antioxidant constituents in plant material have piqued the interest of scientists, food manufacturers, cultivators, and consumers for their roles in the maintenance of human health.

Objective

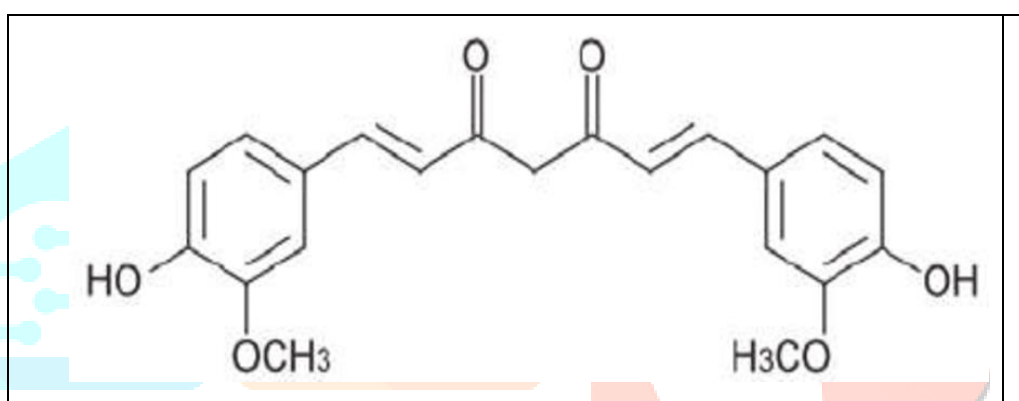
- ❖ To analyses the phytochemicals substance (phenol and tannins) in turmeric.
- ❖ To estimate the antioxidant content in turmeric (FRAP).
- ❖ To evaluate the curcumin content in the selected two sample of turmeric.
- ❖ To study the difference between homemade turmeric and commercial turmeric powder

MATERIALS AND METHODS

SELECTION OF RAW MATERIALS

The collected sample is washed through tap water for removal any type of physical impurities, than removal of bark by using of knife wash it again. Crush the sample in the mortar continuously after complete crushing now kept in oven at 50-60°C up to complete removal of moisture from the sample. The sample is held at room temperature for maintain the higher temperature of sample now sample is ready for extraction with different types of solvent such as chloroform, hexane with the ration 1:10 and set the sample and solvent in the soxhlet assembly for 6-8 hours at boiling temperature of superior solvents after complete extraction of given sample.

Fig -1 Structure of turmeric



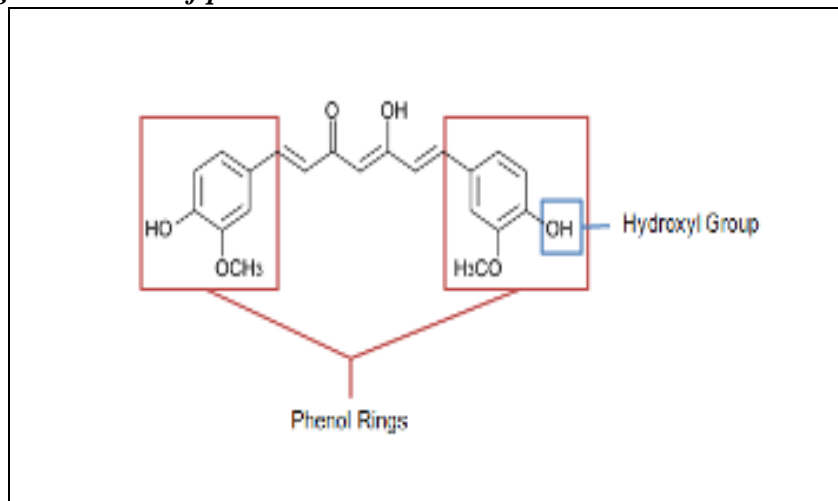
PHYTOCHEMICAL ANALYSIS

Phytochemical are the chemical compounds produced by plants. They are commonly found in fruits, vegetables, nuts, legumes and grains. Some of the well known Phytochemicals are Phenol, Tannis, Flavanoids etc. Phytochemicals present in many foods but it is expected that through bioengineering new plants will be developed, which will contain higher levels. This would make it easier to incorporate energy phytochemical with our food.

Estimation of total polyphenol content

The total polyphenol content (TPC) of the turmeric extracts was estimated spectrometrically according to the folincicalten method and adopted by Afroz et al. Briefly, 0.4ml of the extract (0.25mg/ml) was mixed with 1.6ml of 7.5% sodium carbonate solution. Then, 2ml of 10-fold diluted Folin-ciocalteu reagent was added, and the final reaction mixture was incubated for 1 hours in the dark. The intensity of the blue colored complex was measured at 765nm using a PD-303S spectrophotometer (APEL, Japan). The total polyphenol content present was determined as Gallic acid equivalent (GAE) (6.25, 12.50, 25.00, 50.00, 100.00, and 200.00 µg/ml, $r^2=0.9970$) and was expressed as g of GAE/ 100g of turmeric

Fig 2 Structure of phenol



Estimation of the total tannin content

The total tannin content (TTC) in the turmeric extracts was estimated using the Folin- Ciocalteu method with tannic acid as a standard. Briefly, 0.1ml of the solution containing 1mg of the extract was mixed with 7.5ml of distilled water and 0.5ml of Folin-Cinalteu reagent was added. To the above mixture, 1 ml of 35% sodium carbonate and 0.9ml of distilled water were added. The solution was mixed and then incubated for 30min. The intensity of the developed blue-colored complex was measured at 725nm. The results were expressed as g of tannic acid equivalent (TE) per 100g of turmeric

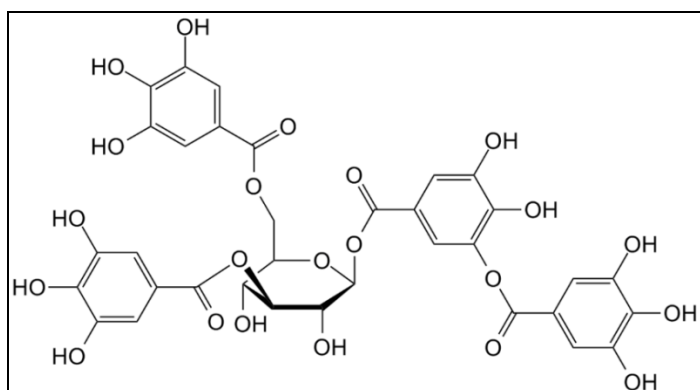


Fig 3 Structure of Tannin

The antioxidant activity of the turmeric samples was determined using the (FRAP) Ferric Reducing Antioxidant power values.

Ferric Reducing Antioxidant power (FRAP)

The Ferric Reducing Antioxidant power assay was performed as described by Benzie and strain. The reduction of a Ferric tripyridyltriazine complex into its ferrous form produces an intense blue color at low pH that can be monitored by measuring the absorbance at different concentrations (62.5-1000.0 µg/ml) was mixed with 1.5 ml of the FRAP reagent, and the reaction mixture was incubated at 37°C for 4 min. The FRAP reagent was prepared by mixing 10 volumes of 300mM acetate buffer (pH 3.6) with 1 volume of 20mM Ferric Chloride (FeCl₃.6H₂O). The FRAP reagent was prewarmed to 37°C and was plotted using an aqueous solution of ferrous sulfate (Fe So₄ 7H₂O) (100-1000 µmol), with FRAP values expressed as micromoles of ferrous equivalent (µM Fe [11] per 100 g of sample).

STATISTICAL ANALYSIS

The collected data were compiled to statistical analysis to find out the impact of analysis of phytochemicals, antioxidant and curcumin results were worked out for statistical analysis with paired 't' test method.

RESULTS AND DISCUSSION

The result of the study Estimation of phytochemicals, antioxidants and curcumin Content in the selected two different samples of turmeric were discussed.

Phytochemicals from the Greek word phyto, meaning plant are biologically active, naturally occurring chemical compounds found in plants, which provide health benefits for humans further than these attributed to macronutrients and micronutrients. They protect plant from disease and damage and contribute to the plants color, aroma and flavor. In general, the plant chemicals that protect plant cells from environmental hazards such as pollution, stress, drought UV exposure and pathogenic attack are called as phytochemicals.

Table 1-List of samples selected for this study

S.no	Name of the sample	Product
1.	Homemade turmeric powder	Turmeric
2.	Commercially packed turmeric powder	Turmeric

Table-1 depict the list of sample selected. The study select homemade turmeric power as sample one and commercial turmeric powder as sample two for analysis.

Phytochemical Phenol in turmeric

Phenolic phytochemicals are the largest category of phytochemicals and the most widely distributed in the plant kingdom. The three most important group of dietary Phenolics are flavonoids, Phenolic acids, and polyphenols, Phenolic are hydroxyl group(-OH) containing class of chemical compounds where the (-OH) bonded directly to an aromatic hydrocarbon

group Phenol (C₆H₅OH) is considered the simplest class of this group of natural compounds. Phenolic compounds are large and complex group of chemical constituents founds in plants.

Table 2 - Analyzed parameters of phenol

S.No	Parameters	Homemade turmeric	Commercial turmeric	Method of Analysis
1.	Phenol (mg/100gm)	206.43	202.16	DGHS method

The above table reveals the analyzed parameters value of phenol. The results shows that the homemade turmeric powder contains phenol of 202.16 mg/100gm of turmeric, like that commercial turmeric powders had phenol contains of 206.43 mg/100g are analyzed using DGHS methods (Directorate general of health services for phenol present. The Phytochemical phenol present in Commercial packed turmeric powder is comparatively higher than homemade turmeric powder.

Phytochemical Tannin in turmeric

From a chemical point of view it is difficult to define tannins since the form encompasses some very diverse digomers and polymers. It might be said that the tannins are a heterogeneous group of high molecular weight polyphenolic compounds with the capacity to form reversible and irreversible complexes with proteins, polysaccharides, alkaloids, nucleic acid and minerals etc. On the basis of their structural characteristics it is therefore possible to divide the tannins into four major activity, enzyme inhibition, antimicrobial activity, oestrogenic activity, antiallergic activity, antioxidant activity, vascular activity and cytotoxic antitumor activity.

Table 3 - Analyzed parameters of tannin

S. No	Parameters	Homemade turmeric	Commercial turmeric	Method of Analysis
1.	Tannin(mg/100gm)	300.10	294.73	DGHS method

The above indicate that analyzed parameters value of tannin. The result shows the home made turmeric powder contains tannin of 300.10 mg/100g of turmeric like that commercial turmeric powders had Tannin contains of 294.73 mg/100g of turmeric. These two sample are analyzed using DGHS methods. The phytochemical tannin present in the turmeric samples give two different values. Among these samples homemade sample has higher amount of tannin in it.

Antioxidant in Turmeric

A substance that reduces damage due to oxygen, such as that caused by free radicals. Well-known antioxidants include enzymes and other substances, such as vitamin C, vitamin E, and beta carotene, which are capable of counteracting the damaging effects of oxidation. Antioxidants are also commonly added to food products such as vegetable oils and prepared foods to prevent or delay their deterioration from the action of air. Antioxidants may possibly reduce the risks of cancer. Antioxidants clearly slow the progression of age-related macular degeneration.

An antioxidant is a molecule that inhibits the oxidation of other molecules. Oxidation is a chemical reaction that can produce free radicals, leading to chain reactions that may damage cells. Antioxidants such as thiols or ascorbic acid (vitamin C) terminate these chain reactions. The term "antioxidant" is mainly used for two different groups of substances: industrial chemicals which are added to products to prevent oxidation, and natural chemicals found in foods and body tissue which are said to have beneficial health effects.

Antioxidant dietary supplements do not improve health nor are they effective in preventing diseases. This includes supplements of beta-carotene, vitamin A, and vitamin E having no effect on mortality rate or cancer risk. Supplementation with selenium or vitamin E does not reduce the risk of cardiovascular disease.

Table 4 -Health Benefit of Antioxidants

Protect vision and the eyes	Reduce the effects of aging on the skin
Help prevent stroke and Heart disease	May help Decrease Risk of Cancer
Antioxidant reduce the damage caused by free Radicals	Antioxidants in food substances are beta carotene, curcumin, selenium, vitamin A, C and E etc.

Table 5 - Analyzed parameters of Antioxidant Activity

S. No	Parameters	Homemade turmeric	Commercial turmeric	Method of Analysis
1	Total Antioxidant activity (µg/g)	1906.45	1841.83	FRAP method

The table displayed above indicates the analyzed parameters value of antioxidant activity. The result shows the home made turmeric powder contains antioxidant activity of 1906.45 µg/g of turmeric like that commercial turmeric powders had antioxidant contains of 1841.83 µg/g of turmeric. These two samples are analyzed using FRAP method (Ferric reducing Antioxidant powder) for antioxidant present. The level of antioxidant content present is high in homemade compare to commercial turmeric.

Curcumin

Curcumin is a bright yellow chemical produced by some plants. It is the principal curcuminoid of turmeric (*Curcuma longa*), a member of the ginger family, Zingiberaceae. It is sold as an herbal supplement, cosmetics ingredient, food flavoring, and food coloring.

Chemically, curcumin is a diarylheptanoid, belonging to the group of curcuminoids, which are natural phenols responsible for turmeric's yellow color. It is a tautomeric compound existing in enolic form in organic solvents, and as a keto form in water. Although thoroughly studied in laboratory and clinical studies, curcumin has no confirmed medical uses, and has proved frustrating to scientists because it is unstable, not bioavailable, and unlikely to produce useful leads for drug development.

Anticancer properties of curcumin

1. Cancer prevention
 - a) Chemoprevention properties.
 - b) Suppression of oncogenes and promotion of tumor suppressor genes.
 - c) Anti-inflammatory activity.
2. Inhibition of tumor growth and cell proliferation.
3. Induction of cancer cell apoptosis.
4. Sensitization of cancer cells to chemotherapy.
5. Inhibition of cancer metastasis.

Table 6 - Analyzed parameters of Curcumin in Turmeric

S.No	Parameters	Homemade turmeric	Commercial turmeric	Method of Analysis
1	Curcumin(g/100g)	3.20	2.86	IS10925Method

The above table represents the analyzed parameters value of curcumin. The result shows the homemade turmeric powder contains curcumin of 3.20g/100g of turmeric like that commercial turmeric powders had curcumin content of 2.86g/100g of turmeric. These two sample are analyzed using IS10925 method for curcumin present. The level of curcumin content present is high in homemade compare to commercial turmeric.

Conclusion

The objective of the research was to evaluate the phytochemicals, antioxidant and determination of curcumin content in the two selected samples of turmeric in Salem district of Tamilnadu. Hence the study pertaining to the research emphasized homemade turmeric powder holds rich phytochemical tannin and phenol than the commercial turmeric powder. Similarly antioxidants such as vitamin A, E selenium etc were also best in homemade turmeric powder. Curcumin content also determines the homemade turmeric powder as excellent. The findings of the present study clearly indicates turmeric the medicinal food substance has potential of being more successful in comparing the two samples of turmeric in Salem district of Tamilnadu.

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