

Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa*

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ABSTRACT

Curcuma longa L. (turmeric) has been utilized as a useful food material, however different pieces of it, for example, leaves are squandered as a result. This work focused on creating turmeric leaves as a utilitarian food material by laying out its ideal extraction condition. Reaction surface technique was applied to enhance turmeric leaf extraction conditions. Turmeric leaves were pulled out with water and ethanol (10, 30, and half). Then, complete phenolic compound substance, all out flavonoid content, and extremist searching action of each concentrate were measured to affirm the ideal extricating dissolvable. As indicated by the outcomes, water was the most effective dissolvable to separate cell reinforcement items, for example, all out phenolic compounds $\{(3.651 \pm 0.0201 \text{ mg GAE/g})\}$ and flavonoids $\{(4.995 \pm 0.107 \text{ mg QCE/g})\}$ content. Revolutionary searching action was additionally higher in water separate contrasted and others like DPPH $(51.110 \pm 2.292\%)$, H₂O₂ $(25.391 \pm 2.691\%)$, and ABTS $(91.082 \pm 0.151\%)$. Focal composite plan was applied to affirm the impact of autonomous factors like temperature (X1) and time (X2) to the yield (Y1). The ethanolic concentrate of Chittagong's Mura contained the most noteworthy centralizations of polyphenols (16.071%), flavonoids (9.66%), and ascorbic corrosive (0.091 mg/100 g) and chora brought about exceptional returns (17.392%). The ethanolic concentrate of Khulna's Mura showed a higher DPPH extremist rummaging action with the most minimal half inhibitory focus (IC₅₀) (1.083 µg/mL), while Khulna's chora had the most elevated FRAP esteem (µM Fe per 100 g). Generally speaking, the ethanolic extricate had higher cancer prevention agent properties than those in the watery concentrate. In any case, the tannin focus was lower in the ethanolic extricate. We reason that the turmeric assortments researched in this study are valuable wellsprings of normal cancer prevention agents, which give huge assurance against free extreme harm.

KEY: Antioxidant, Antimicrobial, *Curcuma longa*, utilitarian food material

Introduction

Turmeric (*Curcuma longa L.*), having a place with the Zingiberaceae family, has been generally utilized as a restorative spice, dietary flavor, food source, food additive, and a shading

specialist in numerous Asian nations [1, 2,9]. *C. longa* L. is a perpetual plant with a short stem and huge leaves that bears praise, pyriform, or oval rhizomes that are caramel yellow shaded and frequently spread [3,5]. Various examinations have been led utilizing turmeric establishes in many structures to research its attributes, usefulness, and applications [4, 5, 10].

Specifically, a few examinations have revealed that turmeric has numerous pharmacological properties, for example, mitigating, cell reinforcement, antitumor, antibacterial and anticoagulant, and antidiabetic in light of its free-extremist searching action [6, 9].

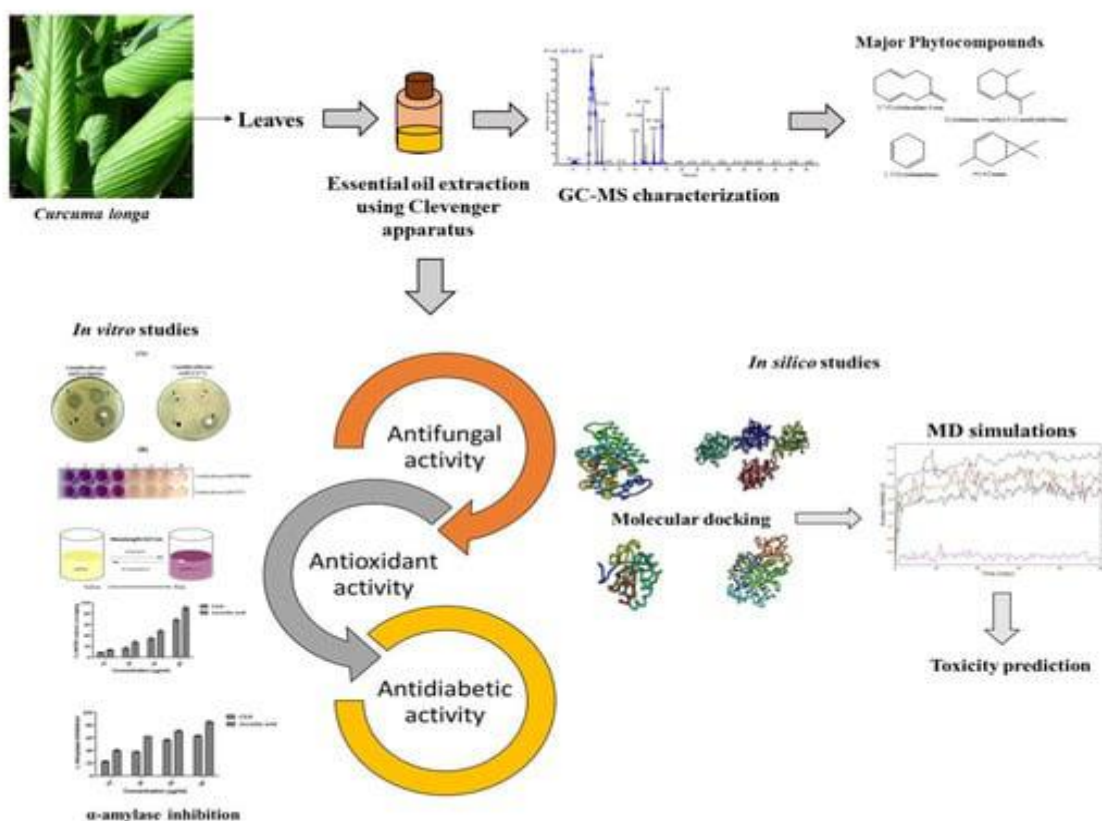


Fig.1: Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa* Flow.

These pharmacological properties of turmeric come from three significant Curcuminoids: curcumin, desmethoxycurcumin, and bisdemethoxycurcumin [7, 5, 7]. Among these Curcuminoids, curcumin is the most often concentrated on substance with its attributes and usefulness including restraint of hepatic lipid collection, calming reaction, and disease cell expansion

Dry turmeric contains 69.4031% starches, 6.301% proteins, 5.101% oils, 3.541% minerals, and different components [9, 8, 5]. The bioactive substance constituents in turmeric have been broadly explored. Until now, roughly 235 mixtures, principally phenolics and terpenoids, have been distinguished from different types of turmeric, including 22 diarylheptanoids and diarylheptanoids, eight phenylpropenes as well as different phenolics, 68 monoterpenes, 109

sesquiterpenes, five diterpenes, three triterpenoids, four sterols, two alkaloids, and fourteen different mixtures [10, 12, 15].

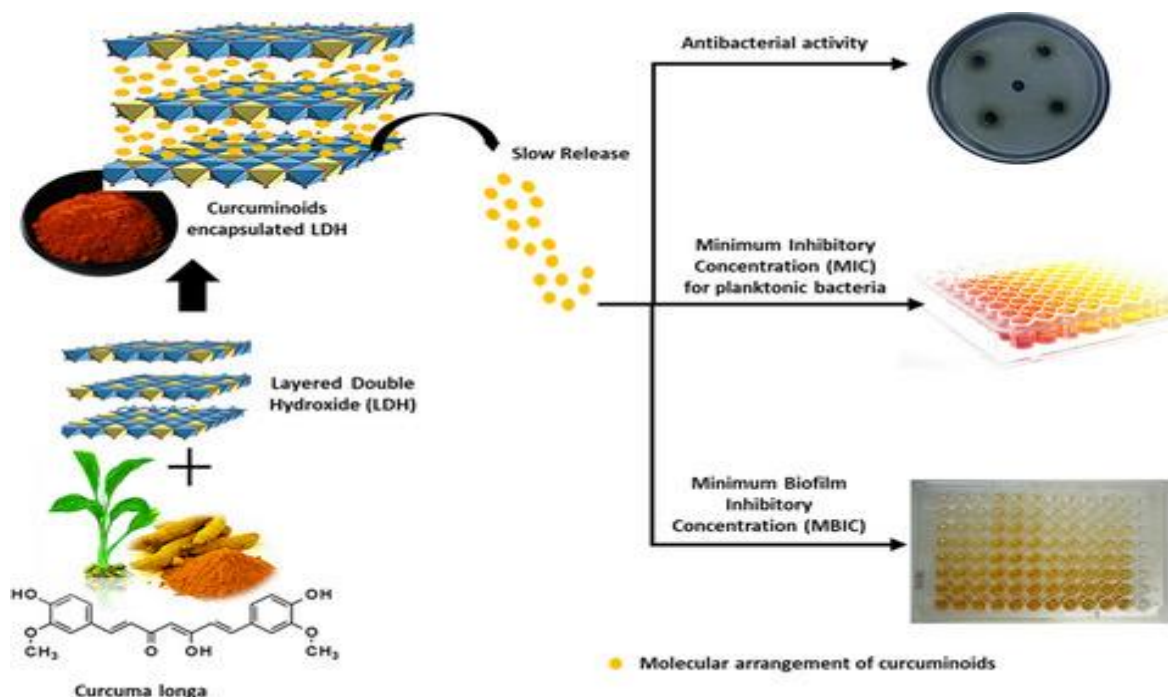


Fig.2: Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa* Process.

Curcuminoids (for the most part curcumin) and natural ointments (basically monoterpenes) are the major bioactive constituents showing different bioactivities. Calebin-A, vanillic corrosive, vanillin, quercetin, and other phenolic compounds have likewise recently been recognized from turmeric.

Materials and Methods

Turmeric leaves were given from Jindoulgeum corp. (Jindo-firearm, Jeollanamdo, Korea). New turmeric leaves were gathered among September and November and washed a few times to dispose of soil and pollutant.

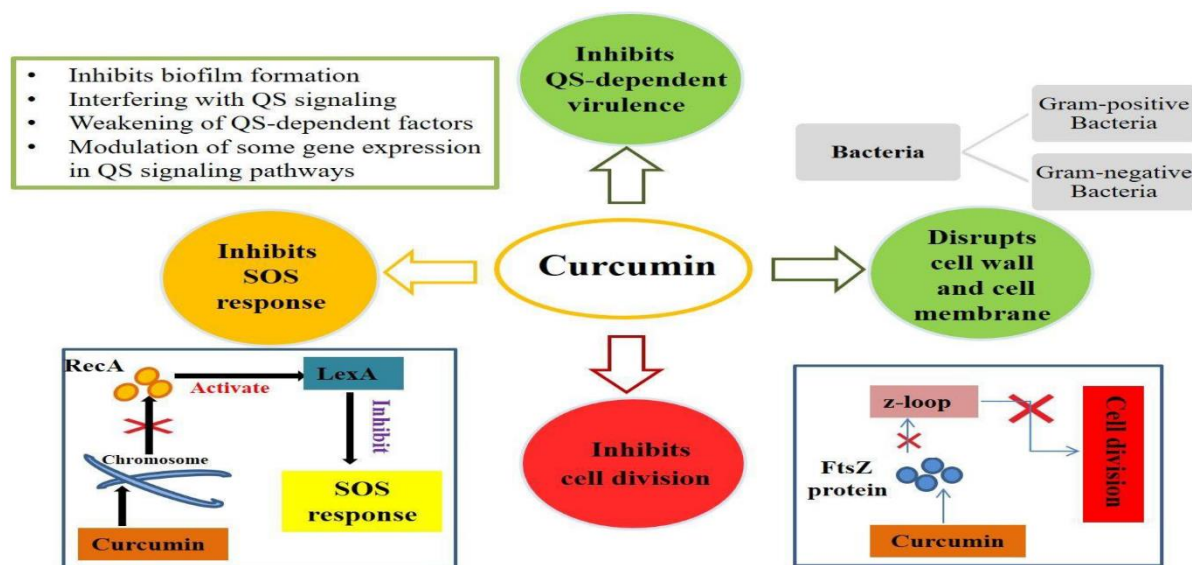


Fig.3: Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa* Cycle.

Then, at that point, the leaves were hot-air dried at 50°C for 24 hr involving a convection stove for capacity and further extraction. From that point onward, the dried leaves were ground as powder and put away at room temperature. In like manner, DPPH (Sigma-Aldrich, Germany) arrangement, 0.1001 M phosphate cradle (pH 5.0), hydrogen peroxide arrangement (Sigma-Aldrich, Germany), 7 mM ABTS (Sigma-Aldrich, Germany), ammonium arrangement, 2.45004 mM potassium persulfate (Sigma-Aldrich, Germany), 50 mM phosphate cushion (pH 6.0, 6.6, 7.4, 7.8 and 8.0), ethanol, and trolox (Sigma-Aldrich, Germany) standard arrangement were utilized to affirm cancer prevention agent action of the concentrate.

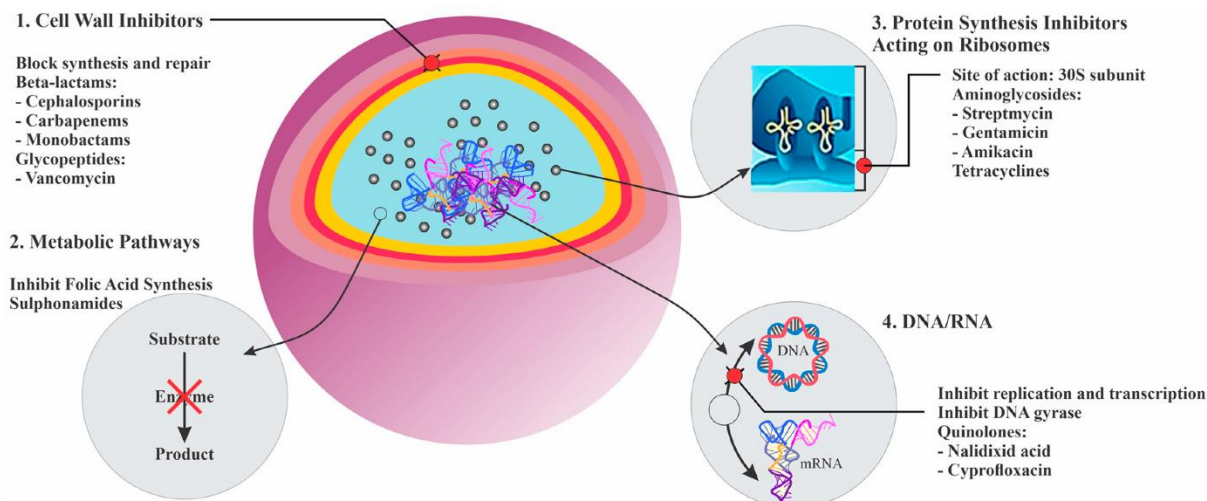


Fig.4: Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa* Observation.

Gallic corrosive, catechin, 1, 1-diphenyl-2-picrylhydrazyl extremist (DPPH), and 2, 4, 6-tris(2-pyridyl)- 1,3,5-triazine (TPTZ) were bought from Sigma-Aldrich (St. Louis, MO, USA). L-ascorbic corrosive, tannic corrosive, Folin-Ciocalteu's phenol reagent, and ferrous sulfate heptahydrate (FeSO₄ 7H₂O) were bought from Merck Co. (Darmstadt, Germany). The

synthetic substances as a whole and reagents utilized in this review were of scientific grade. Subsequent to leading trials, the extraction condition was laid out as 150 min with 1: 25 proportion at 85°C with a 15.588% yield. General Sytheses of the not set in stone to recommend foundation information for additional exploration. All in all, this study affirmed the cell reinforcement property of turmeric leaves and fostered the ideal extraction state of the leaves to advance its application in food industry as another food source.

Total Phenolic Compounds (TPC)

Complete phenolic compound not entirely settled by the Folin-Ciocalteu strategy [15,12,2,5]. To quantify complete phenolic content, 0.5 mL of the turmeric leaf extricate was blended in with 0.3 mL of refined water. Then, at that point, 0.757 mL of 10.4% sodium carbonate arrangement was added and hatched for 3 min. From that point forward, 0.95 mL of refined water and 0.256 mL of Folin-Ciocalteu reagent (Sigma Substance, St. Louis, MO) were added to the combination and hatched for one more 30 min at room temperature. Absorbance was estimated at a frequency of 750 nm. The outcome was communicated as mg of Gallic corrosive (mg GAE/g) in view of the Gallic corrosive standard bend.

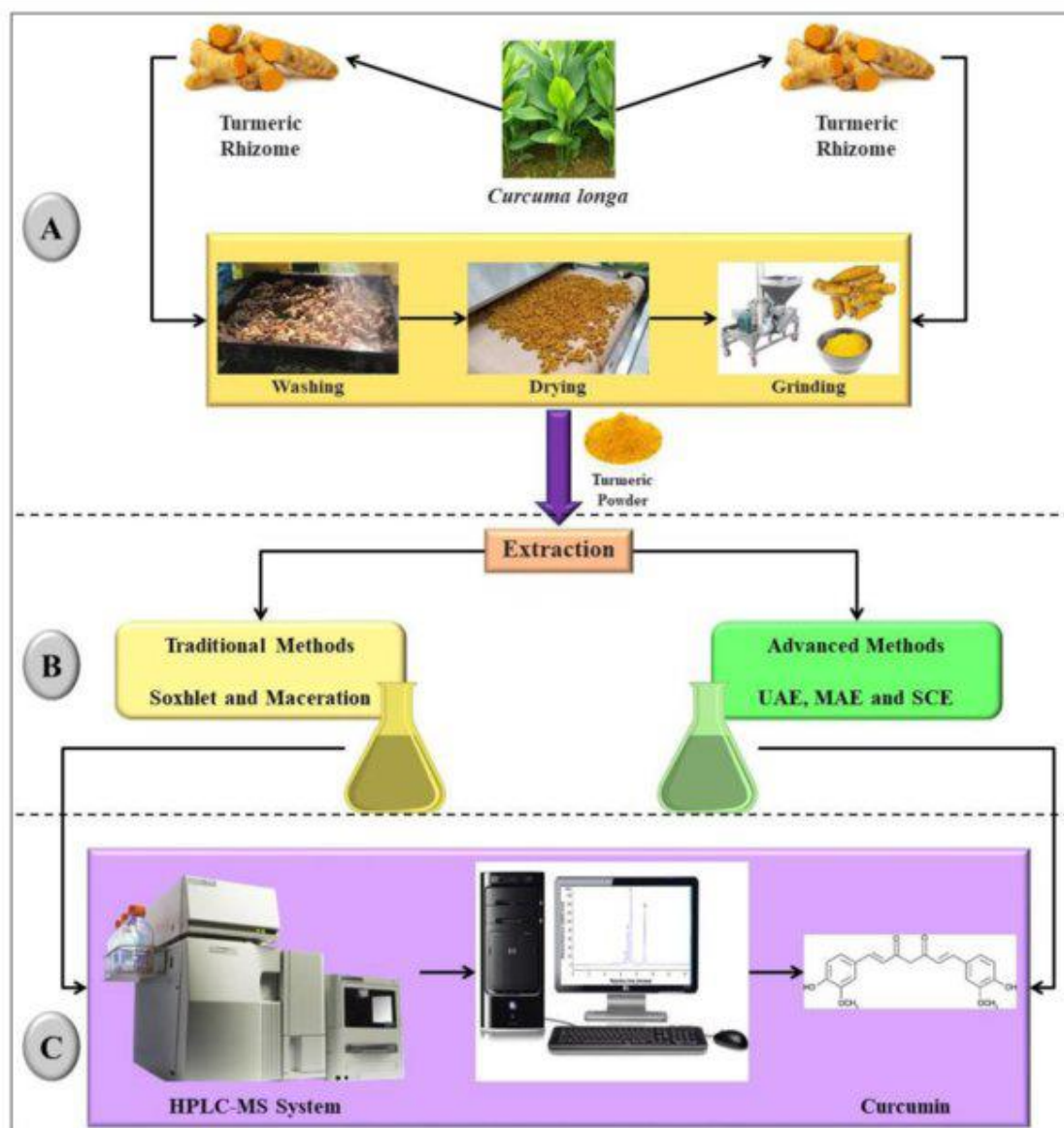


Fig.5: Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa* System

Extract Preparation and Yield Determination

Turmeric tests were cleaned and air-dried in the shade for two days prior to being ground to a fine powder in a blender (CM/L7360065, Jaipan, and Mumbai, India). The fine powder was utilized to get ready both ethanolic and fluid concentrates in light of Kang's technique [13] with slight change. Momentarily, 20% ethanolic remove was ready by adding turmeric powder (20 g) in 70% ethanol answer for make a 100 mL arrangement.

Essentially, for 20% fluid concentrate planning, 20 g of turmeric powder was disintegrated in water to make a 100 mL arrangement. Both ethanol and fluid concentrate arrangements were put in obscurity to keep away from responses that might happen within the sight of light and were shaken in a shaker for 72 h at room temperature. Then, the arrangements were separated

through Whatman No. 1 channel paper and gathered in a turning evaporator (Buchi, Tokyo, Japan) under decreased pressure (100 psi) at 40°C (for ethanol) and 55°C (for water).

Determination of Proximate Composition

To quantify general piece, turmeric leaves were removed under ideal extraction conditions. General organization of dried turmeric and the turmeric leaf separate was investigated following the Relationship of True Scientific Physicists (AOAC) strategies [1, 8,6.8.9]. Starch, unrefined protein, rough fat, rough debris, fiber, and dampness contents were dissected utilizing a similar beginning example in steady scientific condition. Carb content was determined by taking away undeniably estimated upsides of dampness, rough debris, unrefined protein, and rough fat from 100%.

Statistical Analysis

All examinations were acted in three-fold, and the information are accounted for as the mean ± standard deviation (SD). Information were investigated utilizing SPSS (Measurable Bundles for Sociology, variant 16.0, IBM Enterprise, NY, USA) and Microsoft Succeed 2007 (Redmond, WA, USA). Factual examinations of the biochemical information were directed utilizing Tukey's test. Was viewed as measurably huge.

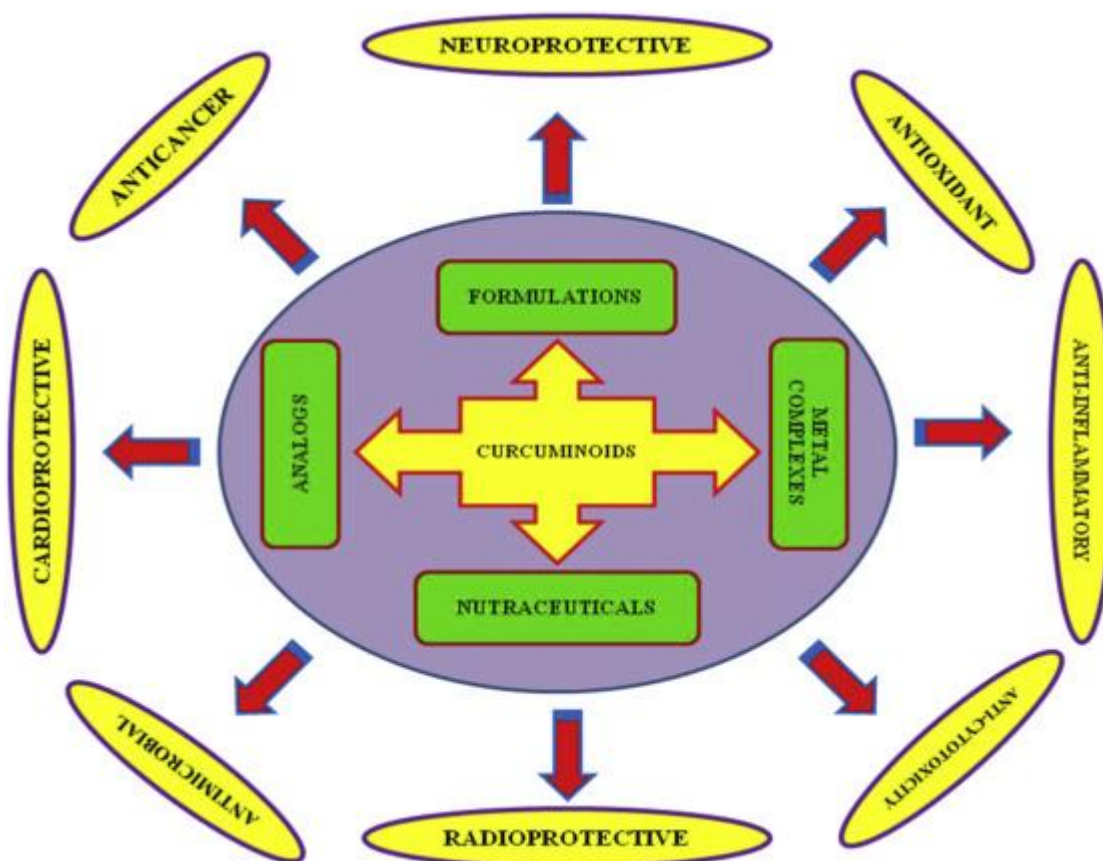


Fig.6: Determination of Antioxidant and Antimicrobial Properties of *Curcuma longa* Monstering.

Discussion

This study is quick to report the cancer prevention agent properties of some well-known turmeric assortments from Bangladesh. The cancer prevention agent properties and extraction yield rely upon both the extraction strategy and the sort of dissolvable utilized during the extraction. The different cancer prevention agent compounds with various substance attributes and polarities of plant materials are dissolvable in various solvents.

Ethanol is a natural polar dissolvable appropriate for the extraction of phenolic compounds and is alright for human utilization [2, 3, 4, 5]. Then again, polar inorganic dissolvable water is typically utilized for the extraction of different bioactive phytochemicals [12, 2, 1, 5, 6, 7]. Our tests demonstrate that the best return of cell reinforcement mixtures can be gotten from the ethanolic concentrate of turmeric assortments (both Mura and chora) gathered from Chittagong division, while the fluid concentrate of chora from Khulna division gave the most reduced yield (7.438%)

We researched the fluid and ethanolic concentrates of various structures (neighbourhood names: mura and chora) of turmeric (*Curcuma longa*) from the Khulna and Chittagong divisions of Bangladesh for their cell reinforcement properties and polyphenol, flavonoid, tannin, and ascorbic corrosive items. The cell reinforcement movement was resolved utilizing the 1,1-diphenyl-2-picrylhydrazyl (DPPH) free revolutionary searching action and ferric lessening cancer prevention agent power (FRAP) values.

Results

Complete phenolic compound substance (TPC) of the turmeric leaf removes was evaluated in view of the direct condition acquired from gallic corrosive norm ($R^2 = 0.9916$) and was plotted at 0.02, 0.04, 0.06, 0.08, 0.09 and 0.10 mg/mL fixation. Subsequently, the TPC esteem was communicated as Gallic corrosive same (mg GAE/g). TPC estimation was recorded at a frequency of 725 nm and did sets of three. As indicated by the determined information, the TPC esteem (mg GAE/g) of the water extricate was 2.7411 ± 0.09924 and that of the ethanol removes was 2.5521 ± 0.4641 (10% ethanol), 2.1061 ± 0.3702 (30% ethanol), and 1.6281 ± 0.2712 (half ethanol), individually.

This implies that water is the best dissolvable to remove cell reinforcement content from turmeric leaves. Absolute flavonoid content (TFC) of the turmeric leaf extricates was determined in light of the direct condition acquired from quercetin standard ($R^2 = 0.9982$). The TFC esteem was communicated as quercetin same (mg QCE/g). As indicated by the trial information, the TFC esteem (mg QCE/g) of the water separate was 4.78 ± 0.01 and that of the ethanol removes was 3.582 ± 0.012 (10% ethanol), 1.732 ± 0.011 (30% ethanol), and 1.611 ± 0.011 (half ethanol), individually. These outcomes show that water is the most reasonable dissolvable to remove cancer prevention agent contents in turmeric leaves. Consequently, further extraction to affirm the ideal concentrate state of turmeric leaves was continued by water as a dissolvable.

Conclusion

The consequence of this paper has its own worth as principal information and the useful foundation of turmeric leaves. From the outcome, this study expects that turmeric leaves can be applied in the food business in view of these information. Also, in vitro and in vivo trials to decide the security foundation and cancer prevention agent usefulness are presently expected for additional exploration and modern application. Utilizing these ideal extraction states of turmeric leaf separate, this study expects to process and foster turmeric leaves as a food source and an option in food industry regions.

Our discoveries unequivocally propose that the turmeric assortments from Bangladesh are promising wellsprings of normal cell reinforcements, as demonstrated by their high items in polyphenols, flavonoids, tannins, and ascorbic corrosive and by their significant DPPH free revolutionary searching exercises and FRAP values. The extraction yields examined in both watery and ethanol concentrates of the turmeric assortments recommend that higher cell reinforcement mixtures could be acquired with ethanol. Chittagong's Mura contains the most noteworthy TPC, TFC, and ascorbic corrosive substance with impressive DPPH free revolutionary rummaging action and a high FRAP esteem.

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