Qualitative Screening of Phytochemicals which present in Curcuma Longa

[1]Anil Govekar, [2]Pooja Jagasia, [3]Mary Stephen

[1]Student, [2]Assistant Professor, [3]Associate Professor
[1]Department of Chemistry,
[1]Vivekanand Education Society's College of Arts, Science & Commerce, Chembur, Mumbai – 400 071, INDIA

Abstract: According to World Health Organization (WHO), medicinal plants contain the best source of bio-active compounds which is used to obtain a variety of drugs and more than 80% of the world population depends on traditional medicine which naturally forms for their primary health care needs. Bio-active compounds are found most naturally in the medicinal plants are known as phytochemicals. Medicinal plants like turmeric which has scientific name *Curcuma Longa*. The bright yellow colour of turmeric comes from polyphenolic pigments which present inside that are mainly comes from fat-soluble known as Curcuminoids. Turmeric contains many phytochemical compounds like tannin, proteins, flavonoids, alkaloids, carbohydrates, etc. These phytochemicals have disease preventive properties because they are non-nutritive chemical plant. In this study, three different types of turmeric samples (i.e., two different dried turmeric powders and one is raw turmeric which later converted into dried powder using an oven at 45^0C) were selected from three different places for screening using the proposed brewing method such as hard, soft and ambient infusion to characterize their anti-oxidant potential. Among them, hard infusion shows the highest anti-oxidant potential as compared to the soft and ambient infusion in all three different turmeric samples. The present study of qualitative phytochemicals screening of turmeric (*Curcuma Longa*), to determine the present phytochemicals and were proved their capability to acts as the source of useful medicinal drugs and also it has potential to improve human health naturally as a result of the presence of various bioactive compounds that are important for good health.

Keywords **- Medicinal plants, Bioactive compounds, Curcuma Longa, Curcuminoids, Phytochemicals, Human health.**

I. INTRODUCTION

Bio-active compounds present in medicinal plants i.e., turmeric which shows biological activities are known as phytochemicals. Turmeric is also known as gold spice because it derives from *Curcuma Longa* plant[1]. Turmeric used as important constituent in Asian food dishes for colour, flavors and taste from ancient times. Turmeric used in several religious ceremonies as well as social ceremonies. It also has medicinal uses against various infectious diseases[1, 2].

Dried turmeric powder contains 69.43% carbohydrates, 6.3% proteins, 5.1% oils, 3.5% minerals, and other elements[3]. Investigation of turmeric is done under suitable proposed methods to find out their bio-active chemical components using different solvents. It was found that approximately 235compounds have been determined from various turmeric species which includes phenols and terpenoids[4].

The bio-active components like essential oils and curcuminoids shows more bio-activities than others bio-active components. Turmeric previously used for identifications of vanillin, quercetin and other phenolic compounds[1,5].

The main objective of this research paper is to identify the anti-oxidant potential and anti-oxidant effects of three different turmeric samples using brewing method such as hard infusion, soft infusion and ambient infusion. Turmeric sample were selected from different places and they are differing from each other.

II. MATERIALS & METHODS

Three different types of turmeric samples collected in which two samples are dried turmeric powder which directly used for the sample preparation collected from Kerala & Satara and one sample is raw turmeric collected from Mumbai that we first cut and placed in oven for drying at 45˚C for 4hours, then converted into powdered form for the sample preparation.

These three samples were prepared by three different recipes and were analyzed for antioxidant potential.

Turmeric Sample Preparation Recipes:

1) **Soft Infusion:** In this preparation, weighed 1g turmeric powder added in distilled warm water having temperature of 75˚C - 85˚C for 3 to 5 minutes[6].
2) **Hard Infusion:** In this preparation, weighed 1g turmeric powder added in distilled warm water having temperature of 75˚C - 85˚C for 25 to 30 minutes[6].
3) **Ambient Infusion:** In this preparation, weighed 1g turmeric powder added in distilled water at room temperature 25± 2˚C for 30 to 40 minutes[6].

All turmeric samples were prepared in glass beaker, then directly filtered using Whatmann filter paper No. 41 into calibrated 50cm^3 standard measuring flask and diluted with distilled water up to the mark.

Phytochemicals	Test Procedure	Result
Steroids	0.5ml extract + 5ml chloroform + 5ml conc. H_2SO_4 acid from the side of test tube.	Upper layer turns into red colour and H_2SO_4 layer showed yellow colour with green fluorescence. This indication shows the presence of steroid.
Tannin	2ml extract + add 2ml $FeCl_3$	Formation of green colour indicates that presence of tannin.
Proteins **Xanthoproteic test:**	1ml extract + add few drops of conc. HNO_3.	Formation of yellow colour indicates the presence of proteins
Coumarin	1.5ml 10% NaOH + 2ml aqueous extract	Formation of yellow colour indicates the presence of coumarins.
Flavonoid- **(a)Alkaline reagent test**	1ml extract + 10% NaOH solution	Formation of intense yellow colour indicates presence of flavonoid
(b) Zn dust test	2ml extract + add Zn dust + conc. HCl	Development of red colour indicates presence of flavonoid
(c) NH_4OH	3ml of extract + 10% NH_4OH solution	Development of yellow fluorescence indicates positive test.
(d) Mg	Extract were treated with Mg turning + conc. HCl to this solution + 5ml 95% ethanol	Formation of crimson red colour indicates presence of flavonoid
(e) Lead acetate	Aqueous extract + 10% of lead acetate solution	Formation of yellow precipitate showed the presence of alkaloids
(f) Sodium hydroxide	1ml aqueous extract + 1ml sodium hydroxide	Aqueous extract showed yellow coloration, this decolorized after addition of acid
Chalcones	2ml of NH_4OH + 0.5gm ethanolic extract	Appearance of red colour showed presence of chalcones.
Phenol **Ferric Chloride test:**	Extract + 4 drops of Alcoholic $FeCl_3$ solution.	Formation of bluish black colour indicates the presence of Phenol.
Cradial Glycoside- **(a) Keller-killani test**	Extract + 2ml glacial acetic acid + drop of $FeCl_3$	Brown colour ring indicates the presence of positive test.
(b) Legal's test	Extract 1ml of pyridine + few drops of freshly prepared sodium nitroprusside solution	Appearance of pink to red colour indicates presence of glycosides.
Phytosterol **Salkowski's test:**	Extract + chloroform and filtered. The filtrate + few drops of conc. H_2SO_4 and shakes, allow standing	Appearance of golden red indicates the positive test.
Diterpenes **Copper acetate test:**	Extract were dissolved in water and treated with 10 drops of copper acetate solution	Formation of emerald green colour indicates presence of diterpenes.
Emodins	1ml Extract + 2 ml of NH_4OH + 3 ml of benzene	Appearance of red colour indicates presence of emodins
Anthraquinone	5ml of Extract + dilute H_2SO_4 +1ml of benzene + 1ml of NH_3	Formation of Rose Pink coloration suggest Anthraquinone
Amino Acids **Ninhydrin test:**	2 ml extract + 2 ml ninhydrin reagent & boil for few minutes	Formation of blue colour indicates the presence of amino acid
Anthocyanin	2 ml aqueous extract + 2 ml of 2N HCl & NH_3	Appearance of pink red turns blue violet indicates presence of Anthocyanin
Leucoanthocyanin	5 ml of isoamyl alcohol + 5 ml of aqueous extract	Upper layer appear red in colour indicates the presence of Leuanthocyanin
Alkoloids: A quantity (3 ml) of concentrated extract was taken into a test tube and 1 ml HCl was added the mixture was heated gently for 20 min cooled and filter, the filtrate was used for following test. **(a) Hager's test**	1ml extract + Hager's reagent	Presence of alkaloids confirmed by the yellow coloured precipitate.
(b) Wagner test	1ml extract + Wagner's reagent	Formation of brown reddish precipitate indicates presence of alkaloids.
(c) Dragendroff's test	2 drops of Dragendroff's reagent + 1ml of the extract.	Development of a creamy ppt was indicative of the presence of alkaloids.
(d) Tannic acid	1ml of extract + 2-3 drops of tannic acid solution reagent	Appearance of amorphous or crystalline precipitate represents the presence of alkaloid
Carbohydrates – Extract were dissolved individually in 5ml of distilled water and filtered. The filtrate was used for the following test. **(a)Iodine test**	2ml of extract + 5 drops of Iodine solution	Gives blue color indicates the positive test.
(b) Molisch's test	Filtrate + 2 drops of alcoholic-naphthol solution	Formation of violet ring at the junction indicates the presence of carbohydrate
(c) Barfored's test	1ml of test solution + 1ml of Barfoed's reagent in a test tube, then keep this test tube in boiling water bath	Brick red colored ppt is formed at the bottom indicating carbohydrate
(d) Fehling test	2ml of extract + dilute HCl and neutralized with alkali & heated with Fehling's solution A and B	Formation of red ppt indicates the presence of reducing sugar.
(e) Benedict's test	Filtrate were treated + Benedict's reagent and heated gently	Orange red ppt indicates the presence of reducing sugar.
Phlobatannins	Aqueous extract is boiled + 1% Aqueous HCl	Deposition of red ppt indicates presence of Phlobatannins
Saponin	5 ml extract + 20 ml of distilled water then agitated in graduated cylinder for 15 min	Formation of foam indicates Saponin.
Glycosides **Borntrager's test**	3ml of aqueous extract + dil H_2SO_4 was added. Boil and filter. Cool the filtrate and add equal volume of benzene was added. This solution was shaken well and the organic layer was separated + equal volume of dilute ammonia solution was added to the organic layer.	The ammonia layer turned pink showing the presence of glycosides
Terpenoids	2ml of aqueous extract + 2ml of acetic anhydride with concentration of H_2SO_4.	Formation of blue, green rings indicated the presence of terpeoids.

Fig. 1. Tests for Screening of Phytochemicals.

III. SCREENING OF PHYTOCHEMICALS

Tests carried out using brewing method which contains three different types of sample recipes i.e., hard infusion, soft infusion and ambient infusion. Total 9 samples prepared using different recipe preparation of three different turmeric sample i.e., 1 turmeric sample contains three different sample of hard infusion, soft infusion and ambient infusion, respectively.

Test for screening of phytochemicals shown Fig. 1.[7].

IV. RESULTS

Table 1. Results of Screening of Phytochemicals.

Phytochemicals	Place from Sample Collected	Ambient	Soft	Hard
Steroids	Satara	-	+	+
	Kerala	+	-	+
	Mumbai	-	-	-
Tannin	Satara	-	-	+
	Kerala	-	-	+
	Mumbai	-	-	+
Proteins	Satara	+	+	+
	Kerala	-	+	+
	Mumbai	+	+	-
Coumarin	Satara	+	+	+
	Kerala	-	+	+
	Mumbai	-	-	-
Flavonoid-	Satara	+	+	+
(a) Alkaline reagent test	Kerala	-	+	+
	Mumbai	-	-	-
(b) Zn dust test	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
(c) NH_4OH	Satara	+	+	+
	Kerala	-	+	+
	Mumbai	-	-	-
(d) Mg	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
(e) Lead acetate	Satara	+	+	+
	Kerala	+	+	+
	Mumbai	+	+	-
(f) Sodium hydroxide	Satara	+	+	+
	Kerala	+	+	+
	Mumbai	+	+	+
Chalcones	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Phenol	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Cradial Glycoside-	Satara	+	+	+
(a) Keller-killani test	Kerala	+	+	+
	Mumbai	+	+	+
(b) Legal's test	Satara	+	-	+
	Kerala	+	+	+
	Mumbai	+	+	+
Phytosterol	Satara	-	+	-
	Kerala	-	-	+
	Mumbai	-	-	-
Diterpenes	Satara	+	+	+

	Kerala	-	+	+
	Mumbai	+	+	-
Emodins	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Anthraquinone	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	+	-	-
Amino Acids	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Anthocyanin	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Leucoanthocyanin	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Alkoloids	Satara	+	+	+
(a) Hager's test	Kerala	+	+	+
	Mumbai	+	+	+
(b) Wagner test	Satara	+	+	+
	Kerala	+	+	+
	Mumbai	+	+	+
(c) Dragendroff's test	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
(d) Tannic acid	Satara	-	+	-
	Kerala	-	-	-
	Mumbai	-	-	-
Carbohydrates-	Satara	-	+	+
(a)Iodine test	Kerala	-	+	-
	Mumbai	-	+	+
(b) Molisch's test	Satara	+	+	+
	Kerala	+	+	+
	Mumbai	+	+	+
(c) Barfored's test	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
(d) Fehling test	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
(e) Benedict's test	Satara	+	+	+
	Kerala	-	-	+
	Mumbai	+	+	-
Phlobatannins	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-
Saponin	Satara	-	-	-
	Kerala	-	-	-
	Mumbai	-	-	-

Glycosides- **(a) Borntrager's test**	Satara	+	-	-
	Kerala	-	+	-
	Mumbai	+	-	-
Terpeniods	Satara	+	+	+
	Kerala	+	+	+
	Mumbai	+	+	+

NOTE: + shows the presence of phytochemicals, - shows the absence of phytochemicals

V. CONCLUSION

The present study contains qualitative study of Curcuma longa i.e., turmeric which contains phytochemicals such as alkaloids, carbohydrates, saponins, reducing sugars, flavonoids, phenols, proteins, tannins, terpenoids and glycosides. This phytochemical acts as a source of useful drugs and also to improve the human health as a result of the presence of these various phytochemicals are important for the good health.

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