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INVESTIGATING THE PRESENCE OF CURCUMINOID IN CRUDE EXTRACTS OF *C. longa* AND *C. zedoaria*

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Curcuma species of Zingiberaceae family is a widely cultivated spice in Asian countries. *C. longa* L. is a well-established commercial source of curcuminoids, whereas *C. zedoaria* Rosc. remains relatively underutilized despite its rich phytochemistry. Comparing their extract yields not only identifies the most efficient solvent systems but also highlights the potential of *C. zedoaria* Rosc. as an alternative or complementary source of curcuminoids. The study focused on the screening of crude extracts obtained using four different solvents: methanol, ethanol, petroleum ether, and distilled water. Curcuminoid were extracted as a crude-extract from Dry Rhizome of *C. longa* and *C. zedoaria using* Soxhlet evaporator for 6 hours. Concentration of 75%, 85% and 95% were used from all three solvents instead of distilled water. Results showed that 75% methanol is the best solvent to extract the curcuminoids from *C. longa* and distilled water is the best solvent for *C. zedoaria.* The absorbance of *C. longa* extracted with all three solvent percentages (75%, 85% and 95%) ethanol has shown a maximum absorbance at the wavelength of 423 nm while all three percentages of methanol show maximum absorbance at the wavelength of 419 nm. The absorbance of ethanol extracted *C. zedoaria* having absorbance range of 267 to 274 nm. The extracts of petroleum ether as well as methanol, with all three solvent percentages (75%, 85% and 95%) as well as distilled water shown a maximum absorbance between 194 nm to 274 nm. The distilled water had shown the lowest absorbance of 194 nm. Acccordingly, *Curcuma longa* extracted in ethanol has shown the presence of curcuminoids. However, *C. zedoaria* does not prove the presence of curcuminoids from the UV spectrophotometer by not showing the absorbance peaks on the referred range of wavelength. The findings suggest continuity research with high-performance liquid chromatography (HPLC) to identify chemicals present in *C. longa* and *C. zedoaria.*

Keywords: *C. longa*, *C. zedoaria*, curcuminoids, UV spectrophotometry analysis

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INTRODUCTION

Turmeric (*Curcuma* spp.) consists of herbaceous plants with thick and fleshy rhizomes and leaves in sheaths that characterize the family Zingiberaceae. Five species of Curcuma are reported in Sri Lanka: *C. albiflora* Thw., *C. aromatica* Salisb., *C. longa* L., and *C. oligantha* Trimen., and *C. zedoaria* Roscoe. Curcumin is the principal bioactive compound in *Curcuma longa* (turmeric) and is responsible for the turmeric's distinct yellow colour. *C. longa* L. and *C. zedoaria* Rosc. are important medicinal plants used in Sri Lankan traditional medicine. The rhizomes of *C. longa* L. and *C. zedoaria* Rosc. have been reported to be rich in medically essential phytochemicals (Fuloria,, et al. 2022). *C. zedoaria* Rosc. remains relatively underutilized despite its rich phytochemistry. The present study aimed to study the presence of Curcuminoid in *C. zedoaria* Rosc. crude extracts while comparing to the curcuminoid present in *C. longa*.

METHODOLOGY

Species selection

The rhizomes of the *Curcuma longa* and *Curcuma zedoaria* varieties were collected from the herbal garden of the Department of Ayurveda. Nawinna, Maharagama**.** The rhizomes were planted and maintained at the Open University of Sri Lanka for the research.

Extracting curcuminoid from rhizome of *Curcuma spp.*

Rhizomes were washed under running tap water for 2 hours followed by shaking 20% Clorox added with three drops of Tween 20 for 30 minutes, keeping another half an hour under running tap water. Rhizome were cut into pieces, dried under indirect sunlight for two weeks, further dried in an oven for 6 hours at 60 ^{0}C. Dried rhizomes were crushed in an electric grinder and sieved. 20 g of the sample was weighted, added to 250 ml of the solvent. Extraction was done in a Soxhlet evaporator for 6 hours using 75%, 85% and 95% concentrations of ethanol, methanol, petroleum ether, and distilled water. The extract was then cooled and concentrated using a rotary evaporator. Each raw sample of turmeric was extracted by the same method, and the yield was calculated.

Preparation of standard solution of Curcumin for UV visible sspectroscopy

The absorbance of *C. longa* and *C. zedoaria* extracts with all three concentrations (75%, 85% and 95%) of solvents were evaluated. Curcumin 10 mg from all three solvent extracts were accurately weighed and transferred in a 100 ml volumetric flask. Methanol was added up to the mark to obtain a concentration of 100 µg/ml of stock solution.

Determination of maximum wavelength by UV-visible spectroscopy
A 5 µg/ml solution of curcumin was scanned using a UV spectrophotometer in the wave length range of 200 - 800 nm, with the solvent used as the blank.

Preparation of standard calibration curve of curcumin by UV visible spectroscopy
The standard calibration curve of curcumin was obtained by measuring the absorbance of curcumin solution in concentration range (1-7 µg/ml) prepared from stock solutions in solvents at 424 nm in triplicate. Calibration curve of curcumin was then plotted with absorbance on y-axis and curcumin concentration on x-axis.

RESULTS AND DISCUSSION

Extracting curcuminoid from rhizome of *Curcuma spp.*

Table 1: *Curcuma longa* crude extract (g)

Solvent	Solvent %		
	75%	85%	95%
Ethanol	10	3	5.2
Methanol	31.68	17.25	4
Petroleum ether	2.3	1	1.2
Distilled water	2.3		

Table 2**:** *Curcuma zedoaria* crude extract (g)

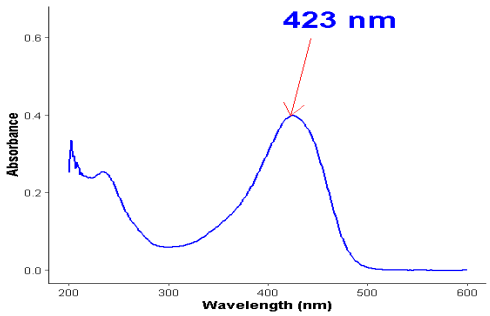
Solvent	Solvent %		
	75%	85%	95%
Ethanol	3	1.42	2.5
Methanol	2.83	0.83	1.83
Petroleum ether	0.65	0.2	0.56
Distilled water	9.1		

Table 1 explains the amount of curcuminoid crude extracts obtained from *C. longa* added with different solvent percentages. The highest curcuminoid crude extract yield 31.68 g, was by 75% methanol, and the lowest 1 g was by 85% petroleum ether. The previous studies reported that the C. *longa*, extract in ethanol we well as methanol have demonstrated superior efficacy in extracting curcuminoids (Manasa, Kamble and Chilakamarthi, 2023).

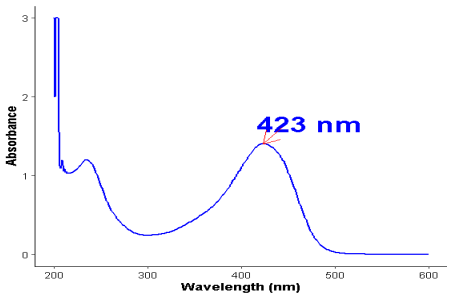
Table 2 explains the amount of curcuminoid crude extracts obtained with the range of solvents from *C. zedoaria*. The highest Curcuminoid amount of 9.1 g was given by distilled water extraction, and the lowest amount 0.2 g was given by 85% petroleum ether concentration. In comparison, extraction studies of *C. zedoaria*

rhizomes, ethanol and methanol have demonstrated superior efficacy in extracting curcuminoids (Budiansyah et al., 2023).

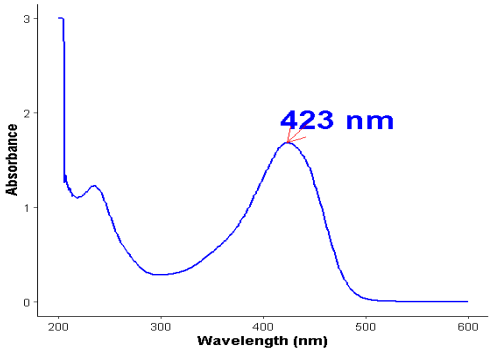
Determination of maximum wavelength by UV vvisible sspectroscopy



(a) 75% Ethanol



(b) 85% Ethanol



(c) 95% Ethanol

Figure 1 (a), (b) and (c): UV Visible spectra of curcumin in *C. longa* extracted with Ethanol

The absorbance of ethanol extracted *C. zedoaria* showed the absorbance range of 267 to 274 nm. The extracts of petroleum ether as well as the methanol with all three solvent percentages (75%, 85% and 95%) as well as distilled water shown a maximum absorbance between 194 nm to 274 nm. The distilled water had shown the lowest absorbance of 194 nm. Further, *C. zedoaria* did not show recommended level of absorbance from all three solvents concentrations. This indicates the curcuminoids which extracts with more phytochemicals have contributed to the UV spectrophotometer analysis. Further studies are required to remove phytochemicals other than curcuminoids to analyze the absorbance of curcumin. The absorbance of *C. longa* extracted with all three solvent percentages (75%, 85% and 95%) ethanol had shown a maximum absorbance at the wavelength of 423 nm while all three percentages of methanol shown maximum absorbance at the wavelength of 419 nm. Curcumin content has been observed to differ among species and the solubility of curcumin in solvents varies significantly as well.

The absorbance of *C. longa* extracted with all three solvent percentages (75%, 85% and 95%) of ethanol had shown a maximum absorbance at the wavelength of 423 nm while all three percentages of methanol shown maximum absorbance at the wavelength of 419 nm. The curcumin concentration of *C. longa* extracted in ethanol is shown in Figures 1 (a), (b), and (c). Petroleum ether extraction of *C. longa* indicated lower UV spectra absorbance between 230 - 405 nm. This indicates the presence of natural compounds such as flavonoids, alkaloids.

CONCLUSIONS/RECOMMENDATIONS

The results showed that 75% methanol is the best solvent to crude extract curcuminoids from *C. longa* and distilled water is the best solvent to crude extracting of curcuminoids from *C. zedoaria. Curcuma longa* extracted in ethanol has shown the presence of curcuminoids. However, *C. zedoaria* does not prove the presence of curcuminoids from the results of the UV spectrophotometer. Therefore, further studies need conducting high-performance liquid cchromatography (HPLC) analysis.

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