REVIEW PAPER ON QUALITATIVE ANALYSIS OF PHYTOCHEMICALS OF *CASSIA OCCIDENTALIS* LINN.

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Abstract

An annual herb with significant therapeutic value is called Cassia occidentalis L. As a result, C. occidentalis is employed as a traditional medicine to treat a variety of illnesses. C. occidentalis has medicinal potential because it contains phytochemicals, which are chemical components that have a specific physiological effect on the human body. All parts of medicinal plants contain phytochemicals that are naturally occurring and act as anti-infective defences. The phytochemical analyses of C. occidentalis reported in this review revealed the presence of alkaloids, flavonoids, phenolics/tannins, proteins/amino acids, saponins, anthraquinones, steroids, terpenoids, fats/oils, etc. The purpose of this review article is to give a general overview of the phytochemicals found in various solvent extracts of seeds, leaves, and flowers, such as PE, CH, ME, and acetone etc.

Key words: *Cassia occidentalis*, Phytochemical studies, Solvent extract, Seeds, Flower, Leaf.

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DOI: 10.48047/ecb/2023.12.si10.00482

Introduction:

From the beginning of time till the present, people have used plants as a source of medicine. At first, these were the primary components of folk or ethnomedicine used in India as well as other countries like China, the Middle East, Africa, and South America. Later, a sizeable portion of this indigenous knowledge was formalised, documented, and eventually transferred into organised medicinal systems like Ayurveda, Yunani, Siddha, or other systems [1]. Plants are a very important source of a variety of bioactive substances that are used directly or indirectly to treat a variety of human diseases [2]. The chemically active compounds in these plants, which have a clear physiological effect on the human body, are what give them their therapeutic significance [3].

Many cultures have used plants in the genus Cassia as part of their traditional medical practises. Species of the well-known botanical Cassia are often found in India and other tropical nations [4]. The synergistic action of its metabolite is likely responsible for the plant's positive properties, which explain why plants from the Cassia species are widely utilised around the world to treat a variety of diseases [5,6].Species of Cassia are members of the Caesalpiniaceae family. The broad family Leguminosae contains several subfamilies, the most common of which is Caesalpiniaceae, also known as Caesalpinioideae [7].

In India, Cassia occidentalis L. is frequently referred to as Kasondi. It is an Ayurvedic plant that has significant medicinal value [8]. The plant is found all throughout Asia, including in India, Mauritius, China, East Africa, South Africa, America, Mexico, the West Indies, and Brazil [7]. It is categorised botanically as Cassia occidentalis and Senna occidentalis. It is a tiny, erect herb that can reach a height of 2 metres [9] and is typically found near roadsides, ditches, and landfills [10]. The plant has broad, green leaves and yellow flowers. The seed pods are dark brown and slightly curved downwards. The olive-brown seeds have flattened edges on both sides. The long-poded seeds can be crushed and turned into a beverage that tastes like coffee [11]..

Fig 1: *Cassia occidentalis* L.

Numerous ailments, including fever, menstruation issues, tuberculosis, liver complaints, and overall weakness and illness, are treated with C. occidentalis [12]. Due to the presence of certain chemical components, including as alkaloids, tannins, saponins, glycosides, flavonoids, etc.,[13] the roots, leaves, and seeds have been used in herbal medicine all over the world [14]. Both acute and chronic inflammation can be reduced by flavonoids [15,16]. Alkaloids are recognised for their ability to reduce blood pressure, balance the nervous system in the case of mental disease, and have antimalarial effects [17]. Tannins promote wound healing and have anti-parasitic properties. Terpenes are indicative of having anti-viral and anti-tumor capabilities [18].

In this review, the research on the phytochemicals of various C. occidentalis sections in various solvent extracts and the research on

phytochemicals influenced by climate are compiled.

Phytochemical Analysis:

The phytochemicals of C. occidentalis have been studied, and it has been found that the kind and quantity of phytochemicals vary with climate. As an illustration, the stems, leaves, and root bark of the plant from Ivory Coast, Africa, contain just a little amount of saponins and no alkaloids, sterols, triterpenes, quinines, tannins, or flavonoids. However, the Ethiopian plant's stem, leaves, and fruits contained a significant amount of alkaloids [19]. The following is a description of the phytochemistry of several plant parts:

Seeds:

According to *Kathirvel et al.,* phenolics/tannins and flavonoids can be found in petroleum ether, chloroform, and methanol extract. Both a chloroform and a methanol extract of the substance include alkaloids, proteins/amino acids, carbohydrates, steroids, terpenoids, cardiac glycoside, and anthraquinones. Oils and fats can be found in petroleum ether and chloroform extracts, however saponins can only be found in petroleum ether extract.

According to *Rajni et al.,* steroids are present in petroleum ether, acetone, methanol, and water extract. Acetone, methanol, and water extracts contain flavonoids, phenols/tannins, amino acids, and glycosides. Both the methanol and the water extracts include saponins, but none of the extracts contain any alkaloids.

Alkaloids, tannins, saponins, carbohydrates, glycosides, phytosterols, oils/fats, phenols, flavonoids, and proteins/amino acids were only found in the water extract, according to *Sathya et al.*

Flowers:

In the petroleum ether, chloroform, and methanol extracts, *Kathirvel et al.* demonstrate the presence of phenolics/tannins, flavonoids, and fats/oils. Both chloroform and methanol extracts contain a variety of substances, including alkaloids, proteins/amino acids, carbohydrates, steroids, terpenoids, and cardiac glycosides. Anthraquinones are absent from all extracts, but saponins are only found in petroleum ether extract.

Leaves:

According to *Nnama et al.*, both n-hexane and dichloromethane extracts included alkaloids, saponins, flavonoids, anthraquinones, and tannins but no cardiac glycosides, steroids, or terpenoids.

According to *Sathya et al.*, water extract lacks alkaloids, glycosides, and flavonoids but contains tannins, saponins, carbohydrates, phytosterols, oils/fats, phenols, and proteins/amino acids.

According to *Taiwo et al*., n-hexane and dichloromethane extracts lack alkaloids, but reveal the presence of tannins, anthraquinones, saponins, and flavonoids.

Alkaloids were discovered in hexane, ethyl acetate, and methanol extracts by *Odeja et al.* Both methanol and ethyl acetate extracts include anthraquinone and resin. Only hexane extracts contain reducing sugar and glycosides. Only the methanol extract contains saponin, tannin, and phenols. All three extracts lack flavonoids, phlobatannin, steroids, and cardiac glycosides.

Alkaloids, flavonoids, saponins, steroids, anthraquinone, tannins, glycosides, and phlobatannins are all present according to Aisha et al., but cardiac glycoside is absent in the methanol extract.

Saganuwan et al. reported that whereas steroids are absent in methanol, hexane, chloroform, and water extract, alkaloids, tannin, glycoside, flavonoid, and saponin are present.

Glycosides and phenolic compounds have been found in ethanolic, chloroform, ethyl acetate, n-butanol, and aqueous extracts, according to *Mohammed et al*. ethanolic, chloroform, ethyl acetate, and n-butanol extracts all contain flavonoids. The extracts from ethanol, ethyl acetate, n-butanol, and water contain saponins and cardiac glycosides. ethanolic, n-butanol, and aqueous extracts all contain tannins. Aqueous and ethanolic extracts both include carbohydrates. But none of the extracts contain any alkaloids.

According to *Usha et al*., ethanolic, methanol, and ethyl acetate extract contain alkaloids, tannin, carbohydrate, steroids, terpenoids, cardiac glycosides, and phlobatannins. Both ethanolic and methanol extracts contain proteins and flavonoids. Only methanol extracts contain anthraquinone and anthocyanosides, whereas ethanol extracts only contain phenolic flavonoids. But none of the extracts include saponins.

In ethanolic, methanolic, and water extracts, *Sadiq et al*. find that tannins, cardiac glycosides, saponins, and anthraquinone are present, whereas alkaloids and flavonoids are not.

Gali et al. found that ethanolic extracts contained tannins, sterols, saponins, alkaloids, terpenoids, and cardiac glycosides but not glycosides, phenols, or flavonoids.

Fig 2: *Cassia occidentalis* seeds, flower, and leaves.

Table 1: Phytochemical analysis of *Cassia occidentalis* seed extracts using various solvents [20-22].

S.No.	Phytochemical constituents	PE	CH	ME	ACE	AQ
1	Alkaloids	-	+	+*	-	+*
2	Phenolics /Tannins	+*	+	+	+	+
3	Flavonoids	+*	+	+	+	+
4	Proteins / Amino acids	-	+	+	+	+
5	Carbohydrates	-	+	+	NT	+
6	Fats / Oils	+	+	-	NT	+
7	Steroids	+*	+	+	+	+
8	Saponins	+*	-	+*	-	+
9	Terpenoids	-	+	+	NT	NT
10	Cardiac Glycosides	-	+	+	NT	NT
11	Anthraquinones	-	+	+	NT	NT
12	Glycosides	-	NT	+	+	+
13	Phytosterols	NT	NT	NT	NT	+

Table 2: Phytochemical analysis of *Cassia occidentalis* flower extracts using various solvents [20].

S. No	Phytochemical constituents	PE	CH	ME
1	Alkaloids	-	+	+
2	Phenolics / Tannins	+	+	+
3	Flavonoids	+	+	+
4	Proteins / Amino Acids	-	+	+
5	Carbohydrates	-	+	+
6	Fats / Oils	+	+	+
7	Steroids	-	+	+
8	Terpenoids	-	+	+
9	Cardiac Glycoside	-	+	+
10	Anthraquinones	-	-	-
11	Saponins	+	-	--

Table 3: Phytochemical analysis of *Cassia occidentalis* leave extracts using various solvents [22, 23-30].

S.No.	Phytochemical constituents	PE	CH	ME	HE	DCM	AQ	EA	ET	n-BT
1	Alkaloids	-	+*	+*	+*	-	+*	+*	+*	-
2	Saponins	-	+*	+*	+*	+	+	+*	+*	+
3	Flavonoids	-	+	+*	+*	+	+*	+*	+*	+
4	Anthraquinones	NT	NT	+	+*	+	+	+*	+*	NT
5	Tannins	-	+	+	+*	+	+	+*	+	+
6	Cardiac Glycosides	-	-	+*	-	NT	+	+*	+	+
7	Steroids	NT	+	+*	-	NT	+*	+*	+	NT
8	Terpenoids	NT	NT	+*	-	NT	NT	+*	+	NT
9	Carbohydrates	-	-	+	NT	NT	+	+*	+	-
10	Glycosides	-	+	+	+	NT	+*	+	+*	+
11	Phytosterols	NT	NT	NT	NT	NT	+	NT	NT	NT
12	Oils / Fats	NT	NT	NT	NT	NT	+	NT	NT	NT
13	Phenolic compounds	-	+	+	-	NT	+	+*	+*	+
14	Proteins / Amino Acid	NT	NT	+	NT	NT	+	-	+	NT
15	Phlobatannin	NT	NT	+	-	NT	NT	+*	+	NT
16	Reducing Sugar	NT	NT		+	NT	NT	-	NT	NT
17	Resin	NT	NT	+	+*	NT	NT	+	NT	NT
18	Anthracyanosides	NT	NT	+	NT	NT	NT	-	-	NT
19	Phenolics flavonoids	NT	NT	-	NT	NT	NT	-	+	NT
20	Sterols	NT	NT	NT	NT	NT	NT	NT	+	NT

PE= Petroleum Ether Extract, **CH**= Chloroform Extract, **ME**= Methanolic Extract, **ACE**= Acetone Extract, **AQ**= Aqueous Extract, **HE**= n-Hexane Extract, **DCM**= Dichloromethane Extract, **EA**= Ethyl Acetate Extract, **ET**= Ethanolic Extract, **BT**= n-butanol Extract, **NT**= Not Tested.

Climate has an impact on these phytochemicals (*). Because of this, certain phytochemicals in the same kind of extracts are present in some research articles but not in others. In those circumstances, however, we have only presented current data here, not absence data.

Conclusion:

In the current work, we describe the phytochemical analysis of seeds, flowers, and leaves of Cassia occidentalis in various solvent extracts. When we reviewed the literature on the phytochemicals of various parts of the cassia occidentalis, we discovered that many of these phytochemicals were present in one research paper but absent in another, for example, Kathirvel et al. revealed the presence of alkaloids in methanol extract while Rajni et al. revealed their absence. Because of this, we can infer that the climate has an impact on the presence of phytochemicals. As a result, researchers can compare their research on the phytochemicals of Cassia occidentalis in various climates.

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