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PHYTOCHEMICAL AND PHARMACOLOGICAL EVALUATION OF *CASSIA AURICULATA*

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ABSTRACT

Cassia auriculata Linn., a plant widely used in traditional medicine, is known for its diverse therapeutic applications, particularly in the treatment of diabetes, infections, and inflammation. This study aims to evaluate the phytochemical composition and pharmacological activities specifically antioxidant and antimicrobial of its ethanolic extract. The dried flower material of *Cassia auriculata* was extracted using ethanol, yielding 3.25% w/w. Preliminary phytochemical screening was performed using standard tests. Antioxidant activity was assessed using the DPPH radical scavenging assay, while antimicrobial activity was evaluated using the agar well diffusion method against *Streptococcus mutans* and *Candida albicans*. Results were compared with standard drugs (Ascorbic acid, Ofloxacin, and Fluconazole). Phytochemical analysis revealed the presence of flavonoids, tannins, phenols, proteins, saponins, and diterpenes. The extract exhibited moderate antioxidant activity with an IC_{50} of 68.68 µg/mL compared to 18.74 µg/mL for ascorbic acid. Antimicrobial testing showed dose-dependent inhibition zones, with maximum activity observed at 100 mg/mL. Although less potent than standard antibiotics, the extract demonstrated measurable efficacy against both bacterial and fungal strains. The ethanolic extract of *Cassia auriculata* possesses significant antioxidant and antimicrobial properties, supporting its traditional medicinal use. These effects are likely due to its rich phytochemical profile, particularly phenolic and flavonoid content. Further studies are needed to isolate active constituents and explore their mechanisms of action.

Keywords: *Cassia auriculata*, Phytochemical screening, Antioxidant activity, DPPH assay, Antimicrobial activity, Herbal medicine, Flavonoids.

INTRODUCTION

Medicinal plants have been a cornerstone of traditional healthcare systems across the world and continue to serve as a valuable source of therapeutic agents. Among these, *Cassia auriculata* L. (family: Fabaceae), commonly known as Tanner's Cassia or "Avaram" in traditional Indian medicine, has attracted attention for its diverse pharmacological activities and rich phytochemical profile. It is widely used in Ayurveda and Siddha systems of medicine for treating diabetes, skin disorders, urinary infections, and eye diseases (Nadkarni, 2002). Phytochemical investigations of *Cassia auriculata* have revealed the presence of several bioactive constituents, including flavonoids, tannins, phenolic compounds,

glycosides, alkaloids, and saponins (Ravikumar *et al.,* 2005; Bhalerao *et al.*, 2013). The flavonoid quercetin, and other phenolic compounds, are particularly abundant in the flowers and are known for their antioxidant, anti-inflammatory, and antidiabetic activities.

Several pharmacological studies have validated the traditional claims associated with this plant. Extracts of *Cassia auriculata* have shown significant antidiabetic (Rajagopal *et al.,* 2004), antimicrobial (Devi *et al.,* 2003), hepatoprotective, and antioxidant effects (Kokilavani *et al.,* 2009). The antidiabetic activity is attributed to its ability to modulate carbohydrate metabolism enzymes and enhance insulin sensitivity. Moreover, its antioxidant potential plays a critical role in mitigating oxidative stress, which is a contributing factor in the pathogenesis of several chronic diseases including diabetes, cardiovascular disorders, and cancer.

Given the increasing interest in plant-based therapeutics and the promising preliminary evidence for *Cassia auriculata*, a comprehensive phytochemical and pharmacological evaluation is warranted. The present study aims to investigate the phytochemical constituents of *Cassia auriculata* and evaluate its biological activities to provide scientific support for its traditional uses and explore its potential in modern phytopharmacology.

MATERIALS AND METHODS

Collection of plant materials

Leaves of *Cassia auriculata* Linn was collected from local area of Bhopal (M.P.) in the month of February, 2025. Drying of fresh plant parts was carried out in sun but under the shade. Dried leaves extract of *Cassia auriculata* were preserved in plastic bags, closed tightly and powdered as per the requirements.

Extraction of plant materials

Following procedure was adopted for the preparation of extract from the shade dried and powdered herbs. Dried powdered of leaves of *Cassia auriculata* has been extracted with ethanol solvent using maceration process for 48 hrs, filtered and dried using vaccum evaporator at 40ºC (Kokate, 1994; Mukherjee, 2007).

Determination of percentage yield

The percentage yield of each extract was calculated by using following formula:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of powder drug Taken}} \times 100$$

Phytochemical Screening

Phytochemical examinations were carried out for extract as per the standard methods (Mukherjee, 2007).

Antioxidant activity of ethanolic extract using DPPH method

DPPH scavenging activity was measured by the spectrophotometer. Stock solution (6 mg in 100ml methanol) was prepared such that 1.5 ml of it in 1.5 ml of methanol gave an initial absorbance (Mishra *et al.,* 2017). Decrease in the absorbance in presence of sample extract at different concentration (10-100 µg/ml) was noted after 15 minutes. 1.5 ml of DPPH solution was taken and volume made till 3 ml with methanol, absorbance was taken immediately at 517 nm for control reading. 1.5 ml of DPPH and 1.5 ml of the test sample of different concentration were put in a series of volumetric flasks and final volume was adjusted to 3 ml with methanol. Three test samples were taken and each processed

similarly. Finally the mean was taken. Absorbance at zero time was taken for each concentration. Final decrease in absorbance was noted of DPPH with the sample at different concentration after 15 minutes at 517 nm.

$$\% \ Reduction = \frac{Control \ \ Absorbance \ \ - Test \ \ absorbance}{\text{Control Absorbance}} x \ 100$$

Antimicrobial activity of ethanolic extract of *Cassia auriculata* by well diffusion method

This agar medium was dissolved in distilled water and boiled in conical flask of sufficient capacity. Dry ingredients are transferred to flask containing required quantity of distilled water and heat to dissolve the medium completely. The flask containing medium was cotton plugged and was placed in autoclave for sterilization at 15 lbs /inch^2 (121^{o}C) for 15 minutes. After sterilization, the molten agar in flask was immediately poured (20 ml/ plate) into sterile Petri dishes on plane surface. The poured plates were left at room temperature to solidify and incubate at 37^{o}C overnight to check the sterility of plates. The plates were dried at 50^{o}C for 30 minutes before use.

The well diffusion method was used to determine the antibacterial activity of the extract prepared from the *Azadirachta indica* using standard procedure (Bauer, 1966). There were 3 concentration used which are 25, 50 and 100 mg/ml for each extracted phytochemicals in studies. It's essential feature is the placing of wells with the antibiotics on the surfaces of agar immediately after inoculation with the organism tested. Undiluted over night broth cultures should never be used as an inoculums. The plates were incubated at 37^{o}C for 24 hr. and then examined for clear zones of inhibition around the wells impregnated with particular concentration of drug.

RESULTS AND DISCUSSION

The current study was designed to investigate the phytochemical composition and pharmacological activities specifically antioxidant and antimicrobial properties—of the ethanolic extract of *Cassia auriculata*.

The percentage yield of the ethanolic extract was found to be 3.25% w/w (Table 1), which is within the expected range for plant extracts and suggests a moderate presence of extractable phytochemicals. The phytochemical screening (Table 2) indicated the presence of key bioactive compounds such as flavonoids, tannins, phenols, proteins, carbohydrates, diterpenes, and saponins, while alkaloids and glycosides were absent. Flavonoids, phenolic compounds, and tannins are particularly known for their antioxidant and antimicrobial properties, supporting the traditional use of *Cassia auriculata* in treating infections and inflammatory conditions.

The antioxidant activity**,** evaluated using the DPPH radical scavenging method, revealed that the *Cassia auriculata* extract exhibited a concentration-dependent increase in % inhibition (Table 3). Although the extract showed lower antioxidant activity than the standard ascorbic acid (IC_{50} = 68.68 µg/mL vs. 18.74 µg/mL for ascorbic acid), it still demonstrated substantial free radical scavenging activity, which can be attributed to its phenolic and flavonoid content. These compounds are known to neutralize free radicals, chelate metal ions, and inhibit oxidative enzymes, thereby playing a protective role against oxidative stress.

The antimicrobial activity of the ethanolic extract was assessed against *Streptococcus mutans* and *Candida albicans*, organisms commonly associated with oral and fungal infections. As shown in Table 5, the extract exhibited dose-dependent antimicrobial activity, with a maximum zone of inhibition of 12 ± 0.94 mm and 15 ± 0.57 mm at 100 mg/mL against *S. mutans* and *C. albicans*, respectively. Although these values were lower than those observed for standard drugs (Ofloxacin and Fluconazole, Table 4), the results suggest that *Cassia auriculata* possesses moderate antimicrobial activity. The presence of saponins, flavonoids, and tannins likely contributes to the disruption of microbial membranes and inhibition of microbial growth.

In summary, the findings support the ethnopharmacological use of *Cassia auriculata* as a natural antioxidant and antimicrobial agent. While the extract's activities are not as potent as synthetic standards, its efficacy at higher concentrations highlights its potential as a complementary therapeutic or as a lead for natural drug development.

Table 1: % Yield of ethanolic extract of *Cassia auriculata*

S. No.	Extract	% Yield (w/w)
1.	Ethanolic	3.25

Table 2: Result of phytochemical screening of ethanolic extract

S. No.	Constituents	*Cassia auriculata* extract
1.	**Alkaloids**	
	Dragendroff's test	-ve
	Wagner's test	-ve
	Mayer's test	-ve
	Hager's test	-ve
2.	**Glycosides**	
	Legal's Test	-ve
3.	**Flavonoids**	
	Lead acetate test	+ve
	Alkaline test	+ve
4.	**Proteins**	
	Xanthoproteic Test	+ve
5.	**Tannins**	
	Gelatin Test	+ve
6.	**Phenol**	
	Ferric Chloride Test	+ve
7.	**Cabohydrates**	
	Fehling's Test	+ve
8.	**Diterpenes**	
	Copper acetate Test	+ve
9.	**Saponins**	
	Froth Test:	+ve

Table 3: % Inhibition of ascorbic acid and extract of *Cassia auriculata* using DPPH method

S. No.	Concentration (µg/ml)	% Inhibition	
		Ascorbic acid	*Cassia auriculata* extract
1	10	42.62	16.26
2	20	53.05	27.35
3	40	60.54	34.79
4	60	75.73	49.85
5	80	79.46	52.57
6	100	86.55	58.74
IC_{50} value		**18.74**	**68.68**

Table 4: Antimicrobial activity of standard drug against selected microbes

S. No.	Name of drug	Microbes	Zone of inhibition (mm)		
			10 µg/ml	20 µg/ml	30 µg/ml
1.	Ofloxacin	*Streptococcus mutans*	15±0.86	18±0.47	22±0.5
2.	Fluconazole	*Candida albicans*	19±0.57	20±0.5	25±0.94

Table 5: Antimicrobial activity of ethanolic extract of *Cassia auriculata* against selected microbes

S. No.	Name of microbes	Zone of inhibition (mm)		
		25mg/ml	50 mg/ml	100mg/ml
1.	*Streptococcus mutans*	9±0.57	11±0.5	12±0.94
2.	*Candida albicans*	10±0.5	13±0.94	15±0.57

CONCLUSION

The present study demonstrated that the ethanolic extract of *Cassia auriculata* possesses significant phytochemical constituents, including flavonoids, phenols, tannins, saponins, and diterpenes, which contribute to its pharmacological effects. The extract exhibited dose-dependent antioxidant activity, as evidenced by its DPPH radical scavenging potential, and showed moderate antimicrobial activity against *Streptococcus mutans* and *Candida albicans*. Although the extract was less potent than standard drugs, its natural origin, safety profile, and broad range of bioactive compounds support its traditional use in herbal medicine. These findings suggest that *Cassia auriculata* has potential as a natural source of antioxidant and antimicrobial agents. Further research is needed to isolate specific active constituents and assess their therapeutic efficacy in vivo.

DECLARATION OF INTEREST

The authors declare no conflicts of interests. The authors alone are responsible for the content and writing of this article.

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