



Antioxidant Potential Of Different Developmental Growth Stages Of Stem Bark And Pods Of *Cassia Fistula* L.

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Abstract:

C. fistula is small, deciduous, medium sized, ornamental, sweet smelling and fragrant tree. It is scattered in different countries like Mauritius, India, Nepal, China, South Africa, East Africa, West Indies, Brazil and Mexico. It possess antitussive, antiviral, antimicrobial, anticancer, anthelmintic, hepatoprotective, insecticidal, antidiabetic, antifertility, laxative, purgative activity. Antioxidant potential of different developmental growth stages of *Cassia fistula* (Caesalpinaceae) stem bark and pod extracted with different solvent such as water, ethanol, methanol was done. Antioxidant potential was determined by DPPH. The DPPH activity in ethanolic and methanolic pulp extracts is greater than aqueous pulp extracts. Thus for the antioxidative compound ethanolic and methanolic medium was suitable for the extraction of *Cassia fistula* bark and pod.

Keywords: DPPH, *Cassia fistula*, antioxidant activity, Medicinal plant

Introduction:

Cassia fistula is sweet smelling and fragrant plant which is originated from the earlier Greek name *Kassia* or *Cassia*. *C. fistula* is small, deciduous medium sized (Edward and Watson, 1993) ornamental (Khare, 2007) tree. It is fast growing tree having height up to 30 to 40 feet and densely moderate, oval, upright, vase shape crown. Kashiwada *et al.*, (1990) showed that because of high concentration of tannins, proanthocyanidins, the DPPH radical scavenging capacity of *C. fistula* stem bark extract was raised. Siddhuraju *et al.*, (2002) investigated the antioxidant properties of 90% methanol extract of *C. fistula* stem bark. Stem bark had more antioxidant activity in terms of inhibition of peroxidation, reducing power, O₂⁻ and DPPH radical scavenging activity. Antioxidants present in the medicinal plants involved to delay oxygen process. They inhibit the polymerase chain reaction initiated by free radicals (Halliwell and Aruoma 1991). Antioxidant defence mechanism present in living organism helps for to remove or repair of damaged molecules (Sun *et al.*, 1998). Synthetic antioxidants are harmful but herbal antioxidants have no side effect (Hou *et al.*, 2003). In the present study The DPPH activity in ethanolic and methanolic pulp extracts is greater than aqueous pulp extracts. Ethanolic 1 month pod shows highest H₂O₂ scavenging potential. Ethanolic extract of different developmental growth stages of pod and stem bark is higher than methanolic and aqueous extracts.

Material and Methods Plant material-

The different developmental growth stages of pods (1 month, 4 month and pulp) and stem bark (young and old bark) of *Cassia fistula* were collected from Akluj. The pods and barks samples were cut into small pieces and oven dried at 60°C. Dried pods and bark samples were grind into powder and stored in air tight plastic container. Oven dried 5g of powdered samples of pod and stem bark were soaked in 100ml distilled water, ethanol. Methanol respectively for 48 hours on shaker then filtered through whatman No.1 filter paper. Filtrate was evaporated by using waterbath. The residue of the extract was dissolved in 50ml of distilled water ethanol and methanol.

i) DPPH (2, 2-diphenyl-1-picrylhydrazyl) radical scavenging activity

The free radical scavenging effect of 1 month old pod, 4 month old pod, pulp and young stem bark and old stem bark of *C. fistula* was assayed in vitro by 1,1-diphenyl-2-picryl-hydrazyl (DPPH) by Koleva *et al.*, (2002) method. Equal volumes of methanolic solutions of DPPH (100µM) and crude extract containing (100µg/ml) were added together. After half an hour the absorbance of the coloured complex was read at 517nm on double beam UV-spectrometer against methanol as blank. The L-ascorbic acid (100µg/ml) was used for positive control. The percentage of DPPH discoloration of sample was calculated by using the formula

$$\frac{(Ac-AE/As) \times 100}{\text{-----}}$$

% inhibition=

Where, Ac

Ac is the Absorbance of control (DPPH),

AE is the Absorbance of DPPH+ plant extract,

As is the Absorbance of standard

Result:

i. DPPH (2, 2-diphenyl-1-picrylhydrazyl) Radical scavenging activity

The DPPH radical scavenging activity of aqueous, ethanolic, methanolic extracts of 1 month old pod, 4 month old pod, pod pulp and young stem bark and old stem bark of *C. fistula* is shown in **fig.1**. The DPPH activity in ethanolic and methanolic pulp extracts is greater than aqueous pulp extracts. It is observed that 4 month old pod also shows higher activity in methanolic, ethanolic and aqueous extracts and young stem bark methanolic, ethanolic and aqueous extracts shows higher activity than old stem bark.

Discussion:

2,2-diphenyl-1-picrylhydrazyl (DPPH) is stable organic free radical proton (Yamaguchi *et al.*, 1998) in its crystalline form but in aqueous solution it becomes more reactive. It contains an odd electron which is responsible for the absorbance at 515-517nm (Brand *et al.*, 1994). Bozin *et al.*, (2008) reported that due to stability in the radical form and simplicity, DPPH radical is used to measure the antioxidant activity. Gadow *et al.*, (1997) states that when absorbance of compound decreases, antioxidant activity increases in terms of hydrogen donating ability. Tissue injury occurs due to extra production of the free radicals (Cross *et al.*, 1987). Due to oxidative injury various disorders like inflammation, viral infections, autoimmune pathologies, digestive disorders, gastrointestinal inflammation are formed (Aruoma, 2003). Antioxidants with free radical scavenging activities play important role to prevent free radical mediated diseases (Hasan *et al.*, 2009).

Plants are the important source of vitamin E, carotene, phenolic acids etc. antioxidants. These antioxidants prevent the disease (Anonymous,

2002). Kavimani *et al.*, (2014) noted that ascorbic acid, tannins, glutathione, flavonoids, cysteine, aromatic amines and tocopherols reduce and due to hydrogen ability DPPH loss its colour.

In the present investigation, different developmental growth stages of pod i.e. 1 month pod, 4 month pod and pulp as well as young stem bark and old stem bark was taken for analyse the DPPH activity. Methanolic extracts of *C. fistula* one month pod shows DPPH radical scavenging activity (40.07 to 75.09% inhibition) was increased in 0.1ml to 0.4ml. 4 month pod and pulp showed maximum DPPH activity as compared to the 1 month pod. Young stem bark showed maximum (15.33 to 79.60%) DPPH radical scavenging activity as compared to old stem bark (12.79 to 66.52%). The standard ascorbic activity showed positive correlation with 4 month pod and pulp. Ethanolic extracts of *C. fistula* one month pod showed DPPH radical scavenging activity (40.14 to 79.40% inhibition) was increased in 0.1ml to 0.4ml. 4 month pod (94.71%) and pulp (9.64%) showed maximum DPPH activity as compared to the 1 month pod as well as bark. Young stem bark showed maximum (62.58 to 88.90%) DPPH activity as compared to old bark (44.56 to 83.13%). The aqueous extract 1 month pod, 4 month pod as well as young stem bark and old stem bark showed maximum activity as compared to pulp (9.97 to 41.44 %). In the present study, methanolic, ethanolic and aqueous extract showed high radical scavenging potential. Thus the different developmental growth stages of pod and stem bark of *Cassia fistula* showed potent antioxidant effect by inhibiting free radicals which will be potent source for the cancer chemoprotective action.

The results of this study show that the methanolic, ethanolic, aqueous extracts are easily available source of natural antioxidants which are useful for pharmaceutical industry.

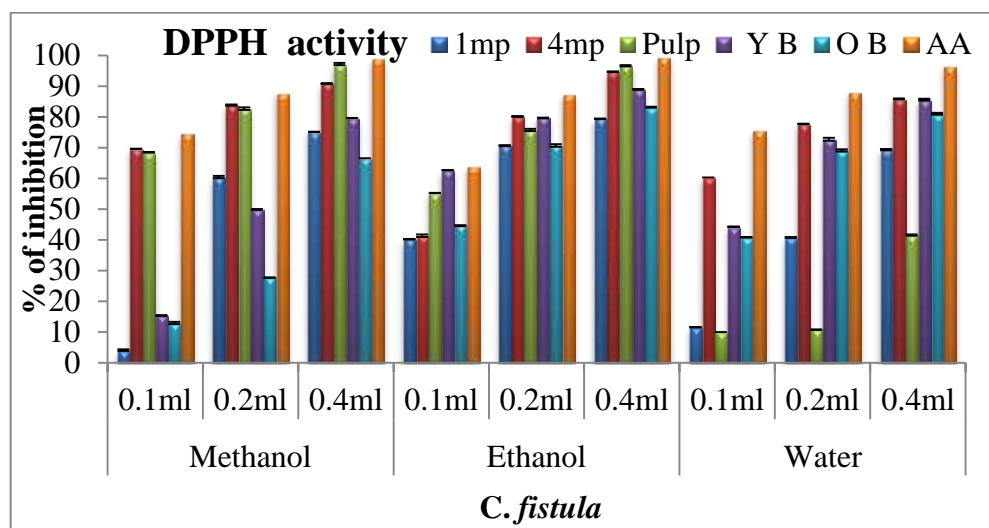


Figure 1: The DPPH radical scavenging activity indifferent developmental growth stages of pod and stem bark of *Cassia fistula*.

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