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Antioxidant Activity of Tectona grandis linn Stem Bark Extract

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ABSTRACT
Tectona grandis linn is a widespread hard wood plant used for both therapeutic and commercial purpose. It is native to south and south-east Asia. the present study was carried out to investigate antioxidant activity of T.grandis (family Verbenaceae) stem bark extracts. Antioxidant activity is measured by DPPH free radical scavenging assay. Stem bark was extracted with ethanol (TGEE). Antioxidant activity of these extracts was measured by DPPH free radical scavenging assay. This assay measures the free radical scavenging capacity of the extract under investigation. At various concentrations (10µg/ml ,20µg/ml 50µg/ml, 100µg/ml), TGEE showed significant antioxidant activity. The TGEE exhibited significant antioxidant activities of T. grandis stem bark due to the presence of various phyto-constituents such as flavanoids, alkaloids, tannins, anthraquinones and saponins.

Key Words: Tectona grandis, stem bark extract, anti oxidant, DPPH, free radical scavenging.

Introduction: Natural products played a very important role in health care and prevention of disease. Natural products are superior to manmade drug because they are always associated with natural and biological entities like proteins, lipids, carbohydrates etc. According to recent studies conduted by World Heath Organization (WHO) about 80% of the world population relies on traditional medicine[1]. About 121 drugs prescribed in USA today comes from natural sources, 90 of which come either directly or indirectly from plat sources[2]. According to ayurveda wood is laxative and useful in treatment of piles, leucoderma and dysentery. Bark is useful in scabies and as an astringent in bronchitis[3].
Tectona grandis Linn.(saag - tick wood), an indigenous medicinal plant, has a folk reputation among the Indian herbs as a hypoglycemic agent. The present study was carried out to evaluate the anti-hyperglycemic effect of *T. grandis* Linn. bark extract in control and alloxan-diabetic rats. Oral administration of the bark suspension of *T. grandis* (2.5 and 5 g/kg body wt.) for 30 days resulted in a significant reduction in blood glucose (from 250 ± 6.5 to 50 ± 2.5 mg/dL). Thus, the previous study clearly shows that the *T. grandis* Linn. bark extract exerts anti-hyperglycemic activity[4]. The phytochemical investigation of the bark of Tectona grandis Linn. afforded a new steroidal glycoside identified as beta-sitosterol-beta-D-[4'-linolenyl-6'-(tridecan-4'"-one-1'"-oxy)] glucuranopyranoside and three new fatty esters, 7'-hydroxy-n-octacosanoyl n-decanoate, 20'-hydroxy eicosanyllinolenate and 18'-hydroxy n-hexacosanyl n-decanoate, along with the known compounds n-docosane, lup-20(29)-en-3beta-ol, betulinic acid and stigmast-5-en-3-O-beta-D-glucopyranoside. Their stereo structures have been elucidated on the basis of spectral data analyses and chemical reactions[5]. In the review[6] the mathanolic and petroleum ether extracts of Tectona grandis seeds were evaluated for anti-inflammatory activity using paracetamol. The conclusion of this study showed significant and dose dependent hepatoprotective activity which proved the hepatoprotective potential of Tectona grandis seeds. In the study of the review[7] the standardization of Tectona grandis by using parmacognostic and phytochemical investigation on stem bark of Tectona grandis. This study reveals qualitative phytochemical screening of Tectona grandis bark extracts.The review[8] says that a provenance trial in teak involving seven provenances from Kerala was conducted during the period from June 1995 to January 1997, Germination behavior of seeds in the nursery was not significantly influenced by the provenances height and tap root length means were largest in the seedlings at the final internal.The study of the review[9] says that Diuertic is any substance which increases the urine and solute excretion Aqueous extract of Tectona grandis revealed the presence of phenolic compounds, carbohydrates, thus aqueous extract of tectona grandis was selected for scientific base of its diuertic evaluation. Phytochemical investigation revealed the presence of phenolic compounds, carbohydrates saponins, tannins and flavonoids are constituents of aqueos extract of tectona grandis. In the paper[10] wound healing activity of different extracts of Tectona grandis was evaluated using Sprague dwaly rats. This paper concludes that the polar extracts i.e. methanolic and aqueous extracts in hydrophobic bases showed significant activity when compared to non polar extracts i.e. petroleum ether, ethyl acetate and chloroform extract did not show significant study. This paper concludes scientific support to the folkloric accounts to the use of the frontal leaves of Tectona grandis in the treatment of wounds. In the review[11] Bronchial asthma is a chronic inflammatory disease, characterized by both bronchoconstriction and airway inflammation. The result of this paper indicated that ethyl acetate extract of Tectona grandis bark show significant anti-asthmatic activity. The anti-asthmatic activity of ethyl acetate extract can be attributed to stabilize the most cell. Study of paper[12] reveals that Tectoa grandis is a widespread heart wood plant used for both therapeutic and commercial purposes. The phytochemical analysis revealed the presence of flavanoids alkaloids, tannins, anthraquinones, saponine, proteins etc. Extraction of ethyl alcohol exhibited significant analgesic and anti-inflammatory activities of T. grandis stem bark due to presence of various phytoconstituents such as flavanoids, alkaloids, tannins, anthraquinones and saponins. In the review[13] it is revealed that used in treatment of diabetes. In this paper it is studied the effect of ethanol extract of Tectona grandis in treatment of diabetes mellitus and associated cardiovascular complications in alloxan induced diabetic rats. Effect of Tectona grandis on various biochemical, hemodyamic were observd. The result obtained in the present study indicate that Tectona grandis may present the cardiac dysfunction in alloxan induced diabetic rats.

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Tectona grandia bark extract is used in Bronchitis, Constipation, Antihelmentic, hyperacidity, dysentery, verminosis, burning sensation, diabetes, leprosy, leucoderma, headache, piles etc. This work is part of the pharmacological claim about the anti oxidant property of stem bark extract. We evaluated the anti oxidant activity of ethanolic extract of T. grandis with the help of free radical DPPH scavenging assay.

Material and Method

The bark of Tectona grandis was collected from National forest centre Bajaj Nagar, Jaipur, Rajasthan .The plants were dried at room temperature under shade and later grinded into fine powder. Ethanolic extract was prepared by putting plant material (250 g) in soxlet apparatus with 95% ethanol till obtain ethanolic extract. The extract was filtered using a buckner funnel and whatman no.1 filter paper. The filtrate was evaporated until it becomes thick paste. In order to measure antioxidant activity DPPH free radical scavenging assay was used. This assay measures the free radical scavenging capacity of the extract under investigation. DPPH is a molecule containing a stable free radical. In the presence of an antioxidant, which can donate an electron to DPPH, the purple colour which is typical for free radical decays and the absorbance was measured at 517 nm using a double beam UV-VIS spectrophotometer [23]. The ethanolic extracts of the plants were re-dissolved in ethanol and various concentration (10, 20, 50 and 100 $\mu g / ml$) of extracts were used. The assay mixture contained in total volume of 1 ml, 500 μl of extract, 125 μl prepared DPPH and 375 μl solvent (methanol). After 30 min of incubation at 25 °C, the decrease in absorbance was measured at 517 nm on spectrophotometer. The radical scavenging activity (RSA) was calculated as a percentage of DPPH using a discoloration using then equation. % RSA = $[(A_0 - A_s)/ A_0] \times 100$. Where A_0 and A_s are the absorbance of control and test sample respectively.

Results and Discussion:

The DPPH radical has been widely used to test the potential of compounds as free radical scavengers of hydrogen donor and to investigate the antioxidant activity of plant extracts [24]. The ethanolic extract of plants showed an effective free radical scavenging in DPPH (2, 2 diphenyl – 1- picryl hydrazyl) assay . The extract of 9,10-dimethoxy-6-methyl-1,4-anthraquinone exhibited antioxidant effect at low concentration. When the extract of the plant was tested for DPPH radical scavenging activity, it was found that 50 $\mu g / mg$ and **100** $\mu g / mg$ of the extract lowered the DPPH radical levels above 46.7% and 88% respectively. Inhabitation of DPPH radicals 50% considered as significant antioxidant properties of any compound [25]. The extract of Lupeol acetate also showed antioxidant property but at higher concentration, which was found to be 10.69% and 23.27% at the concentration of 150 $\mu g / ml$ and 200 $\mu g / ml$ respectively. The results obtained in this study that the plant extract of Tectona grandis showed remarkable antioxidant activity.

Table I shows antioxidant activity of ethanolic extract of *Tectona grandis*.

Table I

Concentration (µg/ml)	DPPH Free radical Scavenging activity (%)
10	15.2
20	22.6
50	84.2
100	89.00

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