FLAVONOIDS AND PHENOLIC COMPOUNDS FROM *Litsea polyantha* JUSS. BARK

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ABSTRACT

Flavonoids and phenolic compounds from plants have been reported to have multiple biological effects. In the present communication, bioactive compounds from Litsea polyantha Juss. bark were studied. The total phenolic content was determined by using the Folin-Ciocalteu reagent and aluminum chloride colorimetric method was used for determination of total flavonoids. The content of phenolics in 100 gm (dry weight) extract of Litsea polyantha Juss. was 511.472 ± 22.304 mg gallic acid equivalent (GAE), while total flavonoid content was 230.785 ± 5.439 mg/g quercetin equivalent in methanol extracts from Litsea Polyantha Juss. Results obtained showed that the plant material studied is a good source of phenolic and flavonoids compounds.

Keywords: *Litsea polyantha;* phenolics; flavonoids, phytomedicine; ethnopharmacology.

1. Introduction

The genus *Litsea*, comprising 622 species, includes evergreen or deciduous shrubs and trees belonging to the *Lauraceae* family, which are distributed mainly in Oceania, America and Asia. *Litsea* plants have been used in ethnomedicine and appear to be very promising leads for possible pharmaceutical exploitation since modern science has made it possible to specify their potential medical significance with antifungal, antiinflammatory, male antiinfertility, antidiarrheal, antioxidant, anti-HIV, cytotoxic, antidepressant, antibacterial, antiseptic, and antithrombotic properties. In fact, *Litsea* plants contains biologically active chemicals, more than 262 compounds that include amides, alkaloids, flavonoids, butanolides and butenolactones, steroids, monoterpenes, triterpenoids, sesquiterpenes, fatty acids, and lignans [1]. However, only a few species have been investigated so far, and much more studies should be carried out on this genus in order to disclose their active principles. This is the case of the bark of *Litsea polyantha* Juss, with a long history of medicinal use in India to treat diarrhea, pains, bruises, contusions and fractures. In the present work, the total phenolic and flavonoid content of methanolic extracts from *Litsea polyantha* Juss were evaluated.

2. Material and methods

2.1 Plant material

The bark of *L. polyantha* Juss. was collected from BIT, Mesra of Ranchi with the help of tribal. The bark was authenticated and the voucher specimen (BIT 417; 2008-09) was preserved in the Department of Pharmaceutical Sciences, BIT, Mesra.

2.2 Extract Preparation

The dried and powdered plant material (Bark) was defatted with petroleum ether in a soxhlet apparatus followed by extraction of the residue with 90% Methanol for 48 hours. The extract was filtered through Whatmann filter paper (No. 1), the solvent was removed under reduced pressure using rotary evaporator and lyophilized (MELP).

2.3 Estimation of total phenolic content of MELP

The total phenolic content of MELP was determined by using the Folin-Ciocalteu reagent. An aliquot (1ml) of extract was added to 25 ml volumetric flask, containing 9 ml of distilled water. Reagent blank using distilled water was prepared. One milliliter of Folin-Ciocalteu's phenol reagent was added to the mixture and shaken. After 5 minutes, 10 ml of 7% Na_2CO_3 solution was added to the mixture. The solution was diluted to volume (25 ml) with distilled water and mixed. After incubation for 120 minutes at room temperature, the absorbance against prepared reagent blank was determined at 750 nm with an UV-Vis Spectrophotometer. Standard curve of Gallic acid solution (25, 100, 300, 400, 500, 600 and 700 µg/ml) was prepared using the similar procedure. Total phenolic content of extract was expressed as mg Gallic acid equivalent/100 gm dry weight extract sample. Samples were measured in three replicates [2].

2.4 Estimation of total flavonoid content of MELP

Aluminum chloride colorimetric method was used for determination of total flavonoids. The plant extract (0.5 ml of 1:10 g/ml) in methanol was mixed with 1.5 ml of methanol, 0.1 ml of 10% aluminum chloride, 0.1 ml of 1 M potassium acetate and 2.8 ml of distilled water. It remained at room temperature for 30 minutes. The absorbance of the reaction mixture was measured at 415 nm in triplicate. The calibration curve was prepared by preparing quercetin solutions at concentrations 10 to 100 μg/ml in methanol [3].

4. Results and Discussion

The content of total phenolics in the methanol plant extract was determined using the Folin-Ciocalteau reagent. The result of total phenolic content was calculated from the regression equation of the standard plot (y=0.0012x+0.0659, r^2=0.999) (fig. 1). The content of phenolics in 100 gm (dry weight) extract of *Litsea polyantha* Juss. was 511.472 ± 22.304 (Mean ± standard deviation) mg gallic acid equivalent (GAE). Phenolic compounds in plants play the key role as primary antioxidants or free radical scavengers. The antioxidant activity of the phenolic compounds is mainly due to their redox properties, which can play an important role in absorbing and neutralizing free radicals, quenching singlet and triplet oxygen or decomposing peroxides [4]. The bioactivity of phenolics may be related to their ability to chelate metals, inhibit lipoxygenase and scavenge free radical [5,6]. It has also been proposed that polyphenolic compounds provide antimutagenic and anticarcinogenic properties in humans, when ~1.0 g was consumed daily from a diet rich in vegetables and fruits [7].

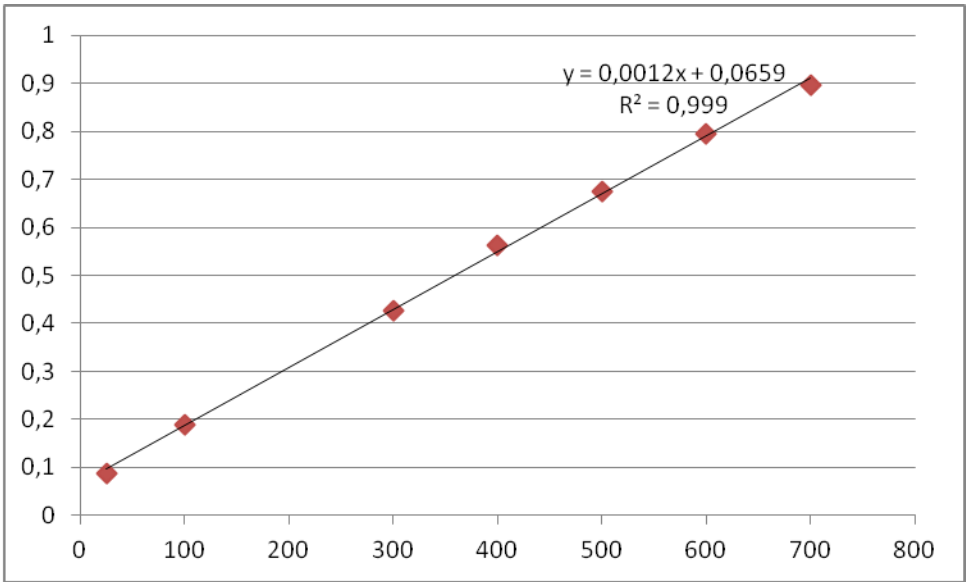

Figure 1: Calibration curve of standard gallic acid for determination of total phenolic content in MELP

Flavonoid content was calculated from the regression equation of the standard plot (y=0.0031x+0.0159, r^2=0.9997) and is expressed as quercetin equivalents (QE) (fig. 2). Total flavonoid content was 230.785 ± 5.439 mg/g quercetin equivalent in MELP. Flavonoids are the most common and widely distributed group of plant's phenolic compounds, characterized by a benzo-γ-pyrone structure. It is ubiquitous in fruits and vegetables.

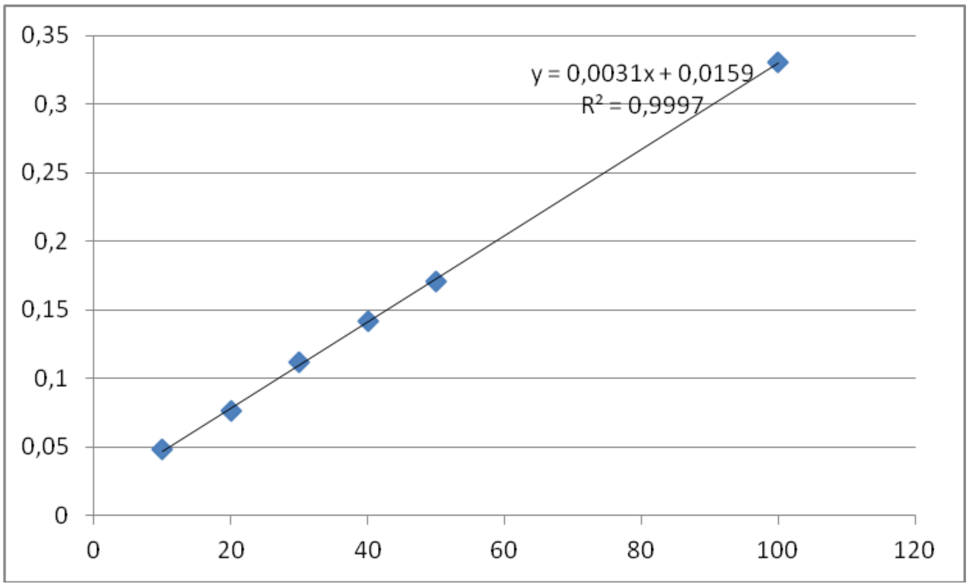

Figure 2: Calibration curve of standard quercetin for determination of total flavonoid content in MELP

Total flavonoid contents can be determined in the sample extracts/fractions by reaction with sodium nitrite, followed by the development of coloured flavonoid-aluminum complex formation using aluminum chloride in alkaline condition which can be monitored spectrophotometrically at wavelength of 415 nm [8]. Several studies reported that flavonoids present in herbs significantly contributed to their antioxidant properties [9]. It has been shown to be highly effective scavangers of most oxidising molecules, including single oxygen and various free radicals.

Future perspectives

Further investigations are required to study the mechanism of actions of *L. polyantha* Juss. and its constituents by which they exert their therapeutic effects. Further researches should focus and explore the specific cellular and molecular targets of various constituents.

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