Phytochemical Screening, Total Polyphenol Content and Antioxidant Activity of *Terminalia catappa* L. Fruit Dried Extract

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ABSTRACT

The aqueous extract of *Terminalia catappa* L. fruit was freeze dried and test for phytochemical screening. The secondary metabolites in dried extract showed the presence of alkaloids, flavonoid, tannins and saponins. Total polyphenol content and antioxidant activity of dried extract were determined using a Prussian Blue and 1,1diphenyl-2-picryl-hydrazyl (DPPH) assay. Result of total polyphenol content and antioxidant activity were 16,69 mg gallic equivalents (GAE)/100 g dw and IC_{50} = 67,35 ppm. The present study revealed that the fruit contain phytochemicals responsible for antioxidant activity.

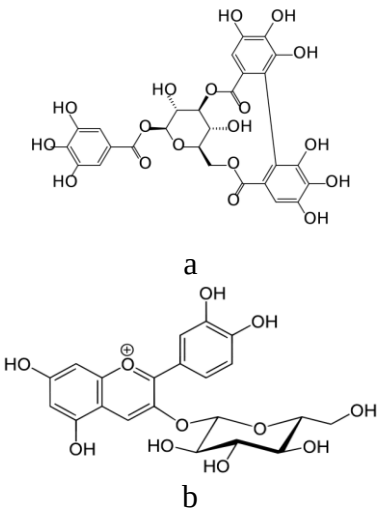
Key words: *Terminalia catappa* L, freeze drying, dried extract, total phenolic, antioxidant activity

Introduction

Plants have been recognized for their vast therapeutic potential as a result of phytochemicals which are distributed in various parts of the plants including the root, leaves, bark and fruit (Harborne, 1986; Manach, 2004; Beecher, 2003). Phytochemicals screening are responsible for the pharmacological properties because of the secondary metabolites, that widely exploited are veritable tool in the global fight against degenerative diseases (Tan *et al.*, 1991). Polyphenolic compounds have been recognize to have medical properties and beneficial impact on health, e.g. antioxidant activity, digestive stimulation action, antiinflammatory, antimicrobial, hypolipidemic, antimutagenic effects and anticarcinogenic potential. The polyphenolic compound has important roles and there is a high and significant correlation between total phenolic contetnt antioxidant activities.

Terminalia catappa L., a medium sized tree has been identified with potent antioxidant activity which has been exploited as curative agents against a number of pathological conditions (Beecher, 2003). Specificallly, its fruits have been used for the treatment of asthma and diabetes (Teotia and Singh, 1997). Besides, it contains cyanidin-3-glucoside and corilagin which are potent inhibitors of Xanthin oxidase and Topoisomerase I and II (Hecht *et al.*, 1992; Kashiwada *et al.*, 1993). The fruit of *Terminalia catappa* has been widely used in folkloric medicine for the treatment of allments (Lin *et al.*, 1997) without any knowledge of the distribution of the phytochemicals and the mechanisms involved in their antioxidant effect. The polyphenolic antioxidative components in plants were extracted by organic solvents such as ethanol, ethyl acetate (Kaur *et al., 1998*), ether (Malekzadeh *et al.*, 2001), and 70% methanol (Saleem *et al.*, 2002), but organic would be harmful to the consumer's health if it is not properly removed from the extract.

The polyphenolic compounds can be extracted with hot water (70-80^{o}C) (Naik., *et al*., 2004), but the process takes a long time due to the low solubility of the compound in the water. The objectives of the present work were to unravel the phytochemical distribution, quantify their total phenolic compounds (TPC) and antioxidant activity of *Terminalia catappa* L. fruit water extract.



a

b

Fig. 1 Chemical structures of corilagin (a) and cyanidin-3- glucoside (b)

Materials and Methods

Fresh, unripe, green fruits of *Teriminalia catappa* L. were dried, grinded and macerated with water. Filtrate Solution was freeze-dried and the dried extract analysed as phytochemical screening, total polyphenol content and antioxidant activity.

1. Phytchemical Screening (Rajendra *et al.*, 2011)

a. Alkaloid:

Dried extract boiled in alcohol/HCl, and filtered. Filtrate added NH_4OH & $CHCl_3$ shake, $CHCl_3$ phase divided into 3 tubes:

- Mayer reagent → white precipitate
- Wagner reagent → brown precipitate
- Dragendorf reagent → red precipitate

b. Tannins:

Dried extract added few drops of aquadest, boiled in water, added 1% gelatine solution in 10% of NaCl → white precipitate.

c. Flavonoids:

Dried extract divided into 2 tubes:

- added few drops of 10% acetic acid → yellow precipitate.
- added Mg powder & 1 mL HCl → orange colour

d. Saponin:

Extract added with hot water, colded, and shaked → foam (10 minutes) with 1-10 cm height.

The Total Polyphenol Content was determined according to Polyphenol Test (Prussian Blue method) : 50 mg of dry water extract was used to determine the total phenolic contect (TPC) and measured by spectrophotometer, using gallic acid as standard.

The antioxydant activity was determined by the 1,1-diphenyl-2-picrylhydrazyl (DPPH) free-radical scavenging assay. Different concentration of extract was prepared in methanol (20, 40, 60, 80, 100 ppm) and monitored the bleaching rate of DPPH at a characteristic wavelength in presence of the extract.

Results & Discussion

The dried extract was rich in alkaloids, flavonoids, tannins and saponin (Table 1). Alkaloids are a diverse group of low molecular weight nitrogen-containing compounds derived mostly from amino acids. These secondary metabolites are found in about 20% of plant species and they classified as true alkaloids. A wide range of biological activities of alkaloids have been reported as emetic, anticholinergic, antitumor, diuretic, sympathomimetic, antiviral, antihypertensive, hypnoanalgesic, antidepressant, miorelaxant, antitussigen, antimicrobial and antiinflammatory. Flavonoids and tannins are polyphenols that have been found to exhibit several antioxidant effects (Masuda, 1999; Chemynier, 2005; Manach *et al*., 2004). An antioxidant, which can quench reactive free radicals, can prevent the oxidation of other molecules and may therefore have health-promoting effects in the prevention of degenerative diseases (Shahidi, 1997). There is a growing interest in natural antioxidants, present attenuate oxidative damage (Silva *et al.*, 2005). Cyanidin-3-glucoside, an active compound in Terminalia catappa L. fruits, is anthocyanin, which is a class of natural

chemicals belonging to the flavonoids and corilagin is a member of the tannin. Saponins reduce the uptake of certain nutrients including glucose and cholesterol at the gut through intra-lumenal physicochemical interaction. Hence, it has been reported to have hypocholesterolemic effects, and thus they may aid in lessening the metabolic burden that would have been placed on the liver. Phytochemical screening of medicinal plants is very important in identifying new sources of therapeutically and industrially important compounds. It is imperative to initiate an urgent steps for screening of plants for secondary metabolites. The present communication attempt to assess the status of phytochemical properties properties in *Terminalia catappa* L. dried extract of medicinal plants to improve the health status of people and also to use in pharmaceutical and nutraceutical products of commercial importance.

Total polyphenolic content of dried extract was 16, 69 mg/g dry weight. Fruits present in this work were consist fleshy portion and seed. Research or search seed and flesh, the total phenol in seed was 3.2 ± 0.22 mg/g GAE and flesh was 48.2 ± 0.88 mg/g GAE (Olokungboye F. F., *et al.*, 2014). The polyphenol content flesh and seed was found higher than the seed and lower than the fleshly portion. This research explain that fleshly portion of fruit *Terminalia catappa* L. must have evolved the ability to synthesize a vast wealth of phytochemicals that readily inhibit pathogenic microorganisms. When the flesh is protected, the seed is indirectly protected. This may partly explain why people habitually eat the fleshy part of the fruit with little or no emphasis on the seed except for a few. Prussian blue method based on spectrophotometric determination was the most sensitive for total phenols determination, The formation of the complex is sensitive and the method was rapid (Gonzales *et al.*, 2003).

The antioxidant activity dried extract showed active activity with IC50 value for the DPPH (IC50 = 67, 35 ppm), and vitamin C as a standard IC_{50} = 3,87 ppm. In conclusion, dried extract has a good content of polyphenolic compounds but better use the fleshly portion only and an active antioxidant activity, therefore they can be used to treat several diseases in which there is an increase in free radical production. Therefore, further studies are needed to identify which other polyphenolic compounds are responsible for the antioxidant activity of the species, and assess the way in which the phenolic substances contribute to this activity. Additional *in vivo* antioxidant assays are needed to confirm the potential use of these species in disease treatment.

Tabel 1. Phytochemical Screening of Dried Extract *Terminalia catappa L.*

Class of Compounds		Dry Water Extract
Alkaloid	Wagner	+
	Dragendorft	+
	Mayer	+
Saponin		+
Tanin		+
Flavonoid		+

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