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Full Length Research Paper

Phytochemistry, Pharmacognostic and HPLC profiling of Methanolic Extract of Fruits of *Ficus polita* Vahl

***Egharevba Henry Omoregie, Ibrahim Jemilat Aliyu, Okhale Samuel Ehiabhi, Wudil Muazzam Ibrahim and Kunle Oluyemisi Folashade**

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria.

**Corresponding author: Egharevba Henry Omoregie.*

Abstract

Ficus politaVahl belongs to the well-known family of edible plants, Moraceae. The methanolic extract of the edible fruit, which is eaten traditionally for dyspepsia, infectious diseases, abdominal pains and diarrhoea, was analysed to establish its' phytochemical and pharmacognostic profile using standard methods. The HPLC profile was also established with flavonoid reference standards. The results of phytochemical screen established the presence of carbohydrates, reducing sugars, resin, glycosides and saponins. HPLC profile suggested the presence of caffeic acid and rutin in the extract. Pharmacognostic analysis suggested that water was a better solvent for extraction than alcohols. The moisture content suggested that the fruit cannot be dried or kept dried in its natural state due to its very high moisture content of over 26%. The presence of carbohydrate and saponins indicates that the fruits or its marc may be useful as supplement in animal feeds and may be useful source of pharmacologically active compounds. The profiles established may be of chemotaxonomic importance.

Keywords: *Ficuspilota, fruit, HPLC profile, caffeic acid, rutin*

Introduction

*Ficus polita*Vahl is a tropical African evergreen shrub or small tree belonging to the family Moraceae, and usually growing up to 15 metres tall, and sometimes to 40 meters tall. The leaves are occasionally harvested from the wild for food. Like most other *Ficus* species, the fruits are sometimes eaten as aphrodisiac and stimulant. The plant is commonly known as Hartblaarvy, Heart-leaved fig, polish fig, rubber plant, wild rubber fig, wild rubber tree (SANBI, 2015). Locally, it is called durumi in Hausa. Traditionally the fruit and young leaf are chewed for dyspepsia (Kuete *et al*., 2011). The young leaves are also edible and the bark and roots infusions are used in treatment of infectious diseases, abdominal pain, dyspepsia and diarrhoea like many of the species of the Moraceae family (Etkin and Ross, 1982; Kamga *et al*., 2010; Kuete *et al*., 2011).

Fig 1: Fruit of *Ficuspolita*

It has been reported that *F. polita* has good nutrient profile and can be fed in combination with *Panicum maximum* to as high as 60% *F. polita* inclusion level for optimal performance of West African dwarf goats without any adverse effect on intake and growth rates of animals most especially when supplemented with approximately 10% cassava peel (Abegunde and Akinsoyinu, 2011; Abegunde*et al*., 2011). The water extract of the plant had been demonstrated to exhibit anti-HIV activity while the leaf extracts exhibit antimalarial activity (Gbeassor *et al.*, 1990; Ayisi and Nyadedzor, 2003). Extracts of methanol and dichloromethane from the plant had also been reported to exhibit anti-inflammatory activities (Recio *et al.*, 1995). The methanolic extract of the root had been found to possess antimicrobial activities and several compounds had been isolated from it (Kuete *et al.*, 2011). Some of the reported compounds include euphol-3-O-cinnamate, (E)-3,5,4'-trihydroxy-stilbene-3,5-*O-β-D*–diglucopyranoside, lupeol, taraxar-14-ene, ursolic acid, β-sitosterol, betulinic acid, sitosterol-3-O-*β-D*-glucopyranoside (Kuete *et al*., 2011). However, unlike the other *Ficus*

species such as *carica, religiosa, racemosa, retusa, hispida, bengalensis* and *thionningii, Ficus pilota* fruit has not been studied in detail (Khan *et al.*, 2011).

Materials and methods

Materials

All reagents used were of analytical grade, and HPLC analysis was performed on Shimadzu HPLC (Kyoto Japan).

Plant collection and preparation

The fresh fruits of *Ficus polita* were collected from Suleja in September 2015. The fruits were chopped into smaller pieces and macerated in methanol for 72 hours. The extract was concentrated in a rotary evaporator and dried over a water bath. The dried extract was kept in an airtight container until required.

Phytochemical and Pharmacognostic analyses

The fruit extract was screened for carbohydrates, saponins, tannins, alkaloids, flavonoids, glycosides and reducing sugar using standard methods (Egharevba *et al.*, 2015a). Proximate pharmacognostic analyses to determine moisture content, ash value and extractive values were also carried out.

Chromatography

The chemical constituents of the extract was analysed by high performance liquid chromatography. The HPLC consisted of Ultra-Fast LC-20AB equipped with SIL-20AC auto-sampler; DGU-20A3 degasser; SPD-M20A UV-diode array detector; column oven CTO-20AC, system controller CBM-20Alite and Windows LC-solution software (Shimadzu Corporation, Kyoto Japan); column, 5µm VP-ODS C18 and dimensions (4.6 x 150 mm). The chromatographic conditions included mobile phase: 0.2% v/v formic acid and acetonitrile (20:80); mode: isocratic; flow rate 0.6 ml/min; injection volume 10 µl of 50 mg/ml solution of extract in methanol; detection UV 254 nm. The HPLC operating conditions were programmed to give solvent B: 20%. Column oven temperature was 40 ^{o}C. The total run time was 50 minutes. Flavonoids and phenolic acid standards such as apigenin, rutin, quercetin, caffeic acid, ferulic acid were employed for the identification of the phyto-constituents of extract by comparing the retention time under similar experimental conditions (Krishna and Manohar, 2014).

Results and Discussion

The results of qualitative phytochemical screening to identify the secondary metabolites present in the plant, thus, revealed the presence of carbohydrates, reducing sugar, saponins, glycosides and resin in the extract (Table 1). These metabolites may be responsible for activities the plant displayed in treatment of skin diseases and gangrenous wounds as claimed by traditional healers (Sofowora, 2008; Evans, 2002).

The water extractive value of 11.1% was greater than the alcohol extractive value of 6.8%, implying that water was a better solvent of extraction (Table 2). The moisture content of 26.3%implied that the fruit could not be stored dried in its natural form. Thus the juice could be extracted and used for other purposes while the marc could be used to fortify animal feeds due to its carbohydrate and saponins content (Abegunde and Akinsoyinu, 2011; Egharevba et al., 2015b). The ash content was 7.8% indicating a good inorganic mineral content.

The HPLC chromatogram of the fruit extract (Table 3 and Figure 3), showed seventeen peaks. Compounds with retention time of 5.171 and 7.451 minute corresponded to the retention time of caffeic acid and rutin, respectively, under similar experimental conditions. The fact that the phytochemical analysis did not detect thesephenolic/flavonoid suggests the need for further investigation to identify some of these compounds in the plant. However, the HPLC chromatogram established a profile for the fruit or fruit samples, which could be used for identification and authentication purposes.

Table 1: Results of phytochemicals analysis of the methanolic extract of the fruit of *Ficus polita*Vahl

Metabolites	Inference
Carbohydrates	+
Reducing sugar	+
Tannins	-
Saponins	+
Glycosides	+
Anthraquinone	-
Alkaloid	-
Flavonoid	-
Resins	+

Key: + = present; - = not detected

Table 2: Results of pharmacognostic analysis

Parameters	Values (%)
Moisture content	26.3%
Alcoholic extractive value	6.8%
Water extractive value	11.1%
Total ash	7.8%

Table 3: Results of HPLC analysis

Peak #	Retention time (min.)	% Composition (% Area)	ReferenceStandard
1	4.009	24.09	
2	5.171	8.10	Caffeic acid
3	6.242	8.38	
4	7.451	40.74	Rutin
5	8.864	5.73	
6	10.199	1.45	
7	11.88	3.09	
8	13.227	1.81	
9	14.216	1.87	
10	16.875	2.00	
11	18.135	0.69	
12	19.868	0.55	
13	21.382	0.70	
14	23.312	0.11	
15	25.529	0.17	
16	29.041	0.28	
17	33.146	0.25	

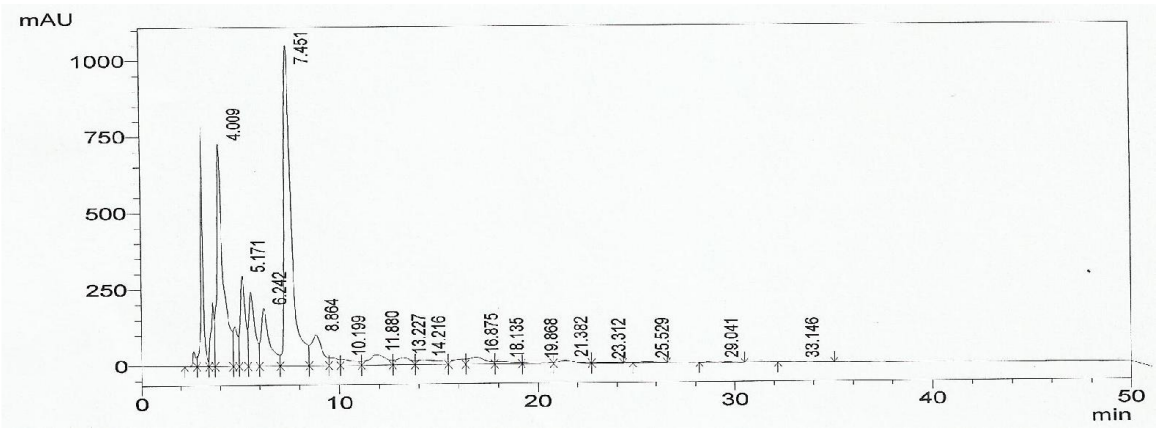

Fig 2: HPLC chromatogram of methanolic extract of *FicuspolitaVahl.*

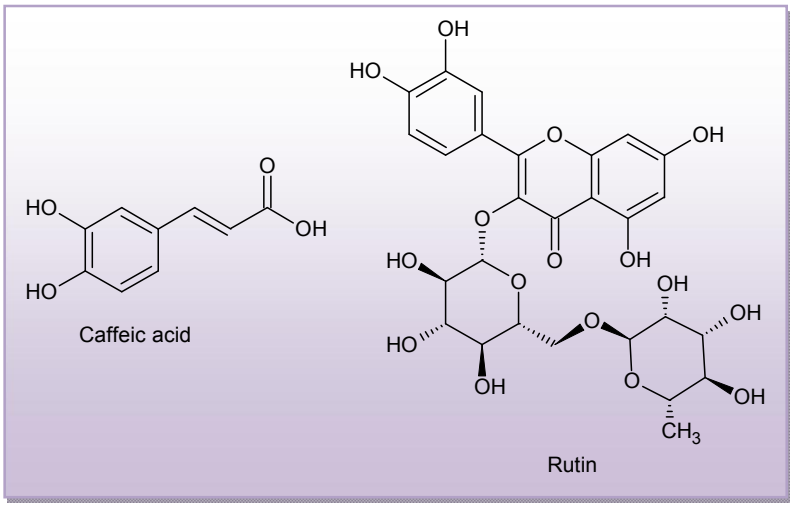

Fig 3: Structures of Caffeic acid and Rutin

Conclusion

The phytochemical, pharmacognostic and HPLC analysis of *F. pilota* fruit extract established the chemical profile of the fruit. The presence of carbohydrate and saponins indicates that the fruits or its marc may be useful as supplement in animal feeds, and also, may be a useful source of pharmacologically active compounds for drug discovery. These profiles could be used for establishing sample authenticity and may be of chemotaxonomic significance.

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