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Full Length Research Paper

Lipid composition of medicinal plants: *Portulaca oleracea* and *Ficus thonningi*

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Lipid compositions of these plants *Portulaca oleracea* and *Ficus thonningi* were analyzed after extraction to determine the biochemical evidence for their therapeutic use as medicinal plants used in Nigeria. The lipids of *P. oleracea* and *F. thonningi* were extracted using chloroform and methanol (2:1), purified using Folch wash and analyzed using thin layer chromatography (TLC) and column chromatography to identify neutral and polar lipids and the various classes of lipids .The percentage composition of the various lipid fractions were calculated. The TLC result showed the presence of some neutral lipids, linoleic acid (66.7%) and triolene (26.7%) in *P. oleracea* and triolene (70%) in *F. thonnningi* and the polar lipids: Linolenic acid (50%),Oleic acid (35%), phospholipids (5%) and diacylglycerol in *P. olerecea* while in *F. thonningi* they were triolene (70%), triglycerol (30%), phosphatidate (26.7%), phospholipid (13.3), diacylglycerol (10%).Total lipid of *P. oleracea* is 35% and *F. thonningi* is 30%.Omega-3 fatty acids (50%) as well as omega-6 fatty acids (66.7%) presented in the biochemical evidence for the therapeutic use of purslane as a medicinal plant.

Key words: Lipids, chromatography, purslane, omega-3, omega-6 fatty acids.

INTRODUCTION

Medicinal properties have been attributed to many plants for thousands of years (Man et al., 2001; Jung et al., 2004).The plants extracts are widely sold as nutritional supplements or tonic and touted as beneficial for health (Brochers et al., 1999). Medicinal plants are useful against some kinds of cancer, lipid peroxidation, hypercholesterolemia, immune function, etc as known in different countries. Coronary heart diseases (CHD) continue to be a leading cause of mortality and morbidity in united state (Starfield, 2000; Smith, 2000; Jacobson, 2001; D'Agostino et al., 2000). It was well established that hypercholesterolemia is a major risk factor for coronary atherosclerosis and arteriosclerosis.

Hyperlipidemia particularly elevated serum cholesterol and low density lipoprotein (LDL) level is a risk factor in the development of atherosclerotic heart disease (Romerol-corral et al., 2006). Although several studies have reported that cholesterol lowering drugs like statins have been quite effective in lowering total cholesterol, LDL cholesterol prevent incidence of coronary heart disease and of ischemic stroke (Law et al., 2003; Wanner et al., 2005; Colivicchi et al., 2007). However, some of the drugs have been associated with side effects like elevated liver enzymes, muscle pain and joint aches, nausea, diarrhea, constipation (FDA MEDWATCH Reporting system, 2003; Chung et al., 2001; Scheen, 2001; Silva et al., 2006) as a result there is potential side effect from cholesterol lowering drugs, growing patient's demand for non-traditional or diet related approaches that could lower blood lipid cholesterol and prevent cardiovascular disease and stroke. Thus there is a renewed effort from researchers (Movahedian et al., 2007; Prasad, 2005) to identify natural sources of nutraceuticals and phytochemical with hypolipidemic and hypocholesterolemic properties.

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Abbreviations: TLC, Thin layer chromatography; **CHD,** coronary heart diseases; **LDL,** low density lipoprotein.

Table 1. Weight of lipids of *P. oleracea* and *F. thonningi*.

Plant sample	Weight (g) of test tube	Weight (g) of test tube + lipid	Weight of lipids (g)
Portulaca oleracea	16.39	16.60	0.21
Ficus thonningi	14.43	14.50	0.14

Table 2. Percentage of total lipids.

Parameter	*Portulaca oleracea*	*Ficus thonningi*
Weight of plant leaves	20 (g)	20 (g)
Weight of total lipid extract	70 (mg)	60 (mg)
Percentage lipid in leaves	35%	30%
Weight of polar lipid	20 (mg)	30 (mg)
Percentage polar lipid	28.6%	50%
Weight of neutral lipid	30 (g)	10 (g)
Percentage neutral lipid	42.9%%	16.7%

It has been reported that medicinal plants like Puslane (*Portulaca Oleracea*) might provide therapeutic benefit to patientswithcardiovasculardiseaseriskfactor (Movahedian et al., 2007). Purslane is found growing in the wild or cultivated in many parts of the world (Minaiyan et al., 2005) and the leaves of purslane are commonly eaten extensively as soups and salads in the Mediterranean countries (Chan et al., 2000) *P. oleracea* is widely distributed in the tropical and sub tropical areas of the world where it is consumed as a nutritious vegetable and used for its pharmacological properties (Ezekwe et al., 2004). The aim of this work is to investigate the lipid compositions of the above mentioned medicinal plants to know the biochemical evidence of their therapeutic properties. Lipids are diverse group of fatty substances found in all living organisms which do not dissolve in water but are soluble in alcohol, ether and other organic solvents. Lipids are essential to life and that they are essential fats that play a very important role in the human body. They help our body to run smoothly in many ways, help the brain to function well, joint mobilization, energy production and also help the body absorb vitamins, coats the cells with lubrication therefore providing protective barrier, acts as messengers in the body (internal cellular communication), work to regulate steroidal hormones. *F. thonningi* is used to treat colds, sore throats, diarrhea and wounds and to stimulate lactation.

MATERIALS AND METHODS

The plant material used was obtained in the pharmacology department of University of Jos. Preparation of activated charcoal 50 ml of sulfuric acid and nitric acid was mixed in a beaker and the mixture was gently poured into a conical flask containing 100 g of charcoal powder with gentle stirring to ensure an even combination of charcoal powder with acid mixture. The next day the aqua region was decanted properly leaving behind the acid-soaked powder, and the charcoal was washed three times with chloroform and methanol to reduce the acidity and was further washed with distilled water. The charcoal was dried in an oven at 40°C for 1 h.

Lipid extraction

200 g of the leaves were washed, aerated and crushed in a mortar using chloroform and methanol for homogenization after which chloroform and methanol 2:1 was used to extract lipids from the leaves. using the method of Folch et al. (1957).

Purification

Lipid extract was purified to eliminate some contaminants by first pouring the extracts into a conical flask through a filter paper containing activated charcoal to remove coloring matters like chlorophyll. A clear supernatant was obtained which was then further purified using The “Folch” procedure as described by Folch et al. (1957)

Desolvenization of purified lipids

Purified lipids were transferred into dry, weighed test tubes and the weight of the lipids was determined as shown on Table 1.

Separation of neutral and polar lipids by silicic acid column chromatography

The separation of lipids was done using the method described by Anekwe et al (1999). The results are shown in Table 2.

Thin layer chromatography (TLC)

This method was used to identify different classes of lipids as described by Anekwe et al. (1999), the results are shown in Tables 2 to 7.

Table 3. Comparism of the standard RF values to the ones obtained for Portulaca oleracea and Ficus thonningi.

Fatty acids/standard RF value	*Portulaca oleracea*	*Ficus thonningi*
Linoleic acid (0.69-0.72)	0.69	-
Triolene (0.78)	0.78	0.78
Linolenic acid(0.31-0.43)	0.45	-
Oleic acid(0.26-0.32)	0.27	-
Phospholipids(0.0)	0.01	0.01
Diaclglycerol(0.04)	0.02	0.02
Triacylglycerol(0.23)	-	0.20
phosphatidate (0.60)	-	0.55
Phosphocholine(0.43)	-	-
Acetylcholine(0.75)	-	-

Table 4. *Portulaca oleracea* (neutral lipids).

Lipid component	Weight (mg)	Percentage (%)
Linoleic acid	20	66.7
Triolene	8	26.7

Table 5. *Portulaca oleracea* (polar lipid).

Lipid component	Weight (mg)	Percentage (%)
Linolenic acid	10	50
Oleic acid	7	35
Phospholipids	1	5
Diacylglycerol	1	5

Table 6. *Ficus thonningi* (neutral lipids).

Lipid component	Weight (mg)	Percentage (%)
Triolene	7	70%

Table 7. *Ficus thonningi* (polar lipids).

Lipid component	Weight(mg)	Percentage (%)
Triglycerol	9	30
phosphatidate	8	26.7
Phospholipid	4	13.3
Diacylglycerol	3	10

RESULTS AND DISCUSSION

The result shows that the percentage lipid content of *P. oleracea* is 35% while that of *F. thonningi* is 30%.The neutral lipids are 42.9% for *P. oleracea* and 16.7% for *F. thonningi* while the polar lipids are 28.6% for *P.oleracea* and 50% for *F. thonningi*. By comparing the RF values obtained to standard retention factor (RF) values. The result of the TLC and column chromatography shows that *P. oleracea* contains; Linoleic acid (66.7%), Triolene (26.7%), Linolenic acid (50%), Oleic acid (35%), Phospho-pholipids (5%), Diacyleglycerol (5%) while that of *F. thonningi* are triolene (70%), triglycerol (30%), phosphati-date (26.7%), Phospholipid (13.3%) diacyglycerol (10%). The predominant lipid of *P. oleracea* is linoleic acid (66.7%) while that of *F. thonningi* is triolene (70%). Both medicinal plants contained triolene, phospholipids and diacylglycerol. These results show that *P. oleracea* contains Essential fatty acids; linolenic acid (omega-3) and linoleic acid (omega-6) and *F. thonningi* contains oleic acids (omega-9) which are precursors of other important biochemical compounds. This work agree with several studies that shows that purslane have high content of omega-3 (Liu et el., 2002; Simopoulos et al., 2005; Omara-Awala et al., 1991).Polyunsaturated fatty acids are very important due to their numerous health benefit; it improves the health of the heart by reducing cholesterol level LDL whose accumulation blocks the arteries resulting to atherosclerosis, if it blocks the heart muscles it results to heart attack, if it blocks the arteries taking blood to the brain it results to stroke, its accumulation in the blood also results to high blood pressure. PUFA also prevents cancer, diabetes, and arthritis amongst other, effective against dermatitis, cystic fibrosis and have anti-inflammatory and acne reductive properties therefore the use of these plants *P. oleracea* and *F. thonningi* as a medicinal plant should be encouraged.

Conclusion

These essential fatty acids (omega-3 and -6) present in *P. oleracea* and *F. thonningi* is the biochemical evidence for the therapeutic and pharmaceutical properties of these plants therefore supporting their use as medicinal plants that can provide therapeutic benefits to patients with cardiovascular disease risk factors (Movahedian et al., 2007) and it also support that purslane offers better nourishment than the major cultivated vegetables due to its shoot that is a rich source of omega-3 fatty acids.

In conclusion, this work encourages the use of *P. oleracea* and *F. thonningi* as medicinal plants to combat the incidence of CHD and the treatment of patients with CHD risk factors as well as maintaining the overall health of the body due to their ability to lower cholesterol levels, lower high blood pressure are also due to their therapeutic and pharmacological properties.

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