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Preliminary Investigation into the Chemical Properties of *Peperomia pellucida* L.

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ABSTRACT

The leaves of *Peperomia pellucida* were studied with the aim of investigating the nutritional and phytochemical properties. Proximate composition and phytochemical properties were analyzed using standard procedures, while mineral compositions were determined with UV/Visible and atomic absorption spectrophotometers. Data were reported as mean of triplicates. Proximate analysis showed a high ash content; the crude fibre content was higher, while the carbohydrate content was observed to be the highest. Mineral analysis showed very low contents of manganese, iron, zinc and copper being the lowest, but high sodium content was observed. Phytochemical screening revealed the presence of alkaloids, cardenolides, saponins and tannins, while anthraquinones was observed to be absent. A result from this present study indicates an affirmation of the use of this plant in management of various ailments. The observed chemicals are responsible for its medicinal properties. The additive or synergistic action of these chemicals and their compounds at target sites associated with physiological process may be responsible for the beneficial effects exerted by *Peperomia pellucida*.

Key words: Phytochemicals, minerals, proximate, medicinal plants, ailments

INTRODUCTION

Plants have long played a significant role in maintaining human health and have also served as food for humans. WHO estimated that over 80% of the earth's inhabitants rely on traditional medicine for their primary health care needs, and most of this therapy involves the use of plant extracts or their active components (Winston, 1999).

Peperomia pellucida is an annual, shallow-rooted herb that belongs to the family Piperaceae (Ghani, 1998). It is found in various shaded, damp habitats all over Asia and the America, growing in clumps, thriving in loose, humid soils, tropical and subtropical climate. It usually grows to a height of about 15 to 45 cm and is characterized by succulent stems, shiny, heart-shaped, fleshy leaves and tiny, dot-like seeds attached to several fruiting spikes (Dos-Santos *et al*., 2001).

The ethnomedical properties of *P. pellucida* is well known. It is used for treating abdominal pain, abscesses, acne, boils, colic, fatigue, gout, headache, renal disorders, and rheumatic joint pain (Ragasa *et al*., 1998; Khan and Omoloso, 2002). In Bolivia, the whole plant is used to stop hemorrhages by Alteños Indians. The roots are used to treat fevers and the aerial parts are used as dressing for wounds (Munoz *et al*., 2000). In northeastern Brazil, the plants have been used

as a hypocholesteremic agent (Bayma *et al.*, 2000). It is a popular cough suppressant, emollient, and diuretic in Guyana and the Amazon as well as effective in the treatment of proteinuria (Arrigoni-Blank *et al.*, 2002; De Fatima Arrigoni-Blank *et al.*, 2004). A decoction of the plant is used in the Philippines to decrease uric acid levels and to treat renal problems. It is also used topically for skin disorders such as acne and boils.

The pharmacology properties of *P. pellucida* are well documented. Aziba *et al.* (2001) reported that the analgesic properties of *P. pellucida* seem to be related to its effect on prostaglandin synthesis. Anti-inflammatory, chemotherapeutic and analgesic properties have been found in crude extracts of *P. pellucida*. It may have potential as a broad spectrum antibiotic, as demonstrated in tests against *Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa* and *Escherichia coli* (Bojo *et al.*, 1994). Chloroform extracts from dried leaves of *P. pellucida* have been shown to exhibit antifungal activity against *Trichophyton mentagrophytes* (Ragasa *et al.*, 1998). No clinical data have been reported on human toxicity.

This study reports the preliminary investigation into the chemical properties of *Peperomia pellucida* with the aim of investigating its nutritional and phytochemical qualities.

MATERIALS AND METHODS

Plant material: *Peperomia pellucida* were harvested from a nearby bush close to the Biochemistry Department, University of Ibadan, Ibadan, Nigeria. They were identified and authenticated at Herbarium of the Department of Botany, University of Ibadan, Ibadan, Nigeria. The leaves were hand-picked and air-dried at room temperature. When dried, they were grounded to fine powder, using a laboratory mill and stored in air-tight containers for laboratory analysis. This study was carried out at the Biochemistry Department, University of Ibadan, Ibadan, Nigeria from January, 2008 too February, 2008. All analysis was carried out in triplicates.

Proximate analysis: Proximate analysis was carried out using the standard procedures of the AOAC (1997).

Mineral analysis: Mineral contents were determined on aliquots of the solutions of the ash of the dried leaf sample by UV/Visible and atomic absorption spectrophotometers (AOAC, 1997).

Phytochemical analysis: The qualitative phytochemical properties of the dried powdered sample were determined using standard methods described by Harborne (1993), Boham and Kocipai (1994), Ebrahimzadeh *et al.* (2008) and Nabavi *et al.* (2008).

Statistical analysis: Data were reported as mean of triplicates. Statistical analyses were carried out using SPSS for Windows, version 14.0 (SPSS Inc. Chicago, IL.USA).

RESULTS AND DISCUSSION

P. pellucida was observed to have high ash content (20.00%); the crude fiber content was higher (22.35%); with carbohydrate content the highest value (38.97%). The fat content was observed to be very low (1.08%) (Table 1).

The calcium content of *P. pellucida* was observed to be 1.82%; magnesium was observed to be 0.62%; while that of potassium was 0.59% (Table 2).

Table 1: Proximate composition of *Peperomia pellucida*

Parameters	Composition (%)
Crude fiber	22.35
Proteins	7.68
Ash	20.01
Moisture	9.91
Fat	1.08
Carbohydrate	38.97

Data are mean of triplicates

Table 2: Mineral composition of *Peperomia pellucida*

Minerals	Composition
Calcium	1.82 %
Magnesium	0.62 %
Potassium	0.59 %
Sodium	17.11 ppm
Manganese	0.43 ppm
Iron	0.66 ppm

Data are mean of triplicates

Table 3: Phytochemical properties of *Peperomia pellucida*

Phytochemicals	Bioassay
Alkaloids	+
Cardenolides	+
Anthraquinones	-
Saponins	+
Tannins	+

+: Present; : Absent

Phytochemical screening of *P. pellucida* revealed the presence of alkaloids, tannins and cardenoloids. Anthraquinones was observed to be absen (Table 3).

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years, and have served humans well as valuable components of food and medicines (Winston, 1999). The chemical properties of plants have been shown to be responsible for these nutritional and healing properties (Setchell and Cassidy, 1999). This study reports the chemical properties of *P. pellucida*.

The high crude fiber and carbohydrate contents compared favourably to studies by Aliyu *et al.* (2009) which reported high contents in *Anisopus mannii* (Asclepiadaceae). Food fibers have been shown to aid absorption of dietary minerals as well as reduce absorption of cholesterol (Aliyu *et al.*, 2009). The observed ash content was higher than those reported on other medicinal plants such as *Senna-siamea* (Cassia Leaves): 17.93% (Alli Smith, 2009); *Anisopus mannii* (Asclepiadaceae): 10.36% (Aliyu *et al.*, 2009); and *B. falcatum*: 4.68% (Adnan *et al.*, 2010). It was however lower than those of *F. tenacissima*: 24.38 and *V. officinalis*: 27.91% (Adnan *et al.*, 2010). The high ash content is an indication of the high mineral contents of the leaves of *P. pellucida*. The crude protein content compared favourably with and in most cases surpassed those reported for most medicinal plants (Abolaji *et al.*, 2007; Aliyu *et al.*, 2009; Adnan *et al.*, 2010). This signifies the healing properties of *P. pellucida* as proteins are essential for the synthesis/repair of body tissues and as enzymes (Vaughan and Judd, 2003). The low fat

content corroborates the findings of many authors which show that leafy vegetables are poor sources of lipids (Ejoh *et al*., 1996). Due to the general low level of crude fat in vegetable leaves and its high level of total unsaturated fatty acid, their consumption in large amounts would be beneficial to individuals suffering from overweight or obesity.

The health benefits of dietary minerals are well established. *P. pellucida* was observed to have a sodium concentration of 17.11 ppm which is rather too low compared to that observed by Adnan *et al*. (2010) on *F. tenacissima* (314 ppm) and *L. angustifolia* (375 ppm) respectively. The observed low sodium concentration makes the plant a potent herb in the management of hypertension, as high sodium content has been shown to contribute to hypertension in susceptible individuals, leading to increased calcium loss in urine (Wardlaw, 1999). The concentrations of the other micro mineral studied were observed to be very low compared to other medicinal plants (Adnan *et al*., 2010; Njoku and Akumefula, 2007).

The pharmacological and biochemical actions of phytochemicals have been widely reported by Amadi *et al*. (2006). Phytochemical screening of *P. pellucida* revealed the presence of alkaloids, cardenolides, saponins and tannins. Alkaloids have been reported to be the most efficient therapeutically significant phytochemical (Njoku and Akumefula, 2007). Stray (1998) reported that pure isolated alkaloids and their derivatives are basic medicinal agents because of their analgesic antispasmodic and bacterial properties. The hypocholesterolemic effect of saponins have been reported by Price *et al*. (1978), this may be attributed to its intra-luminal physicochemical interactions which reduces the uptake of certain nutrients including glucose and cholesterol (Alli Smith, 2009). The pesticidal activity of saponins has also been reported (Irvine, 1961). Saponin-glycosides are very toxic to cold-blooded organisms, but apparently not to mammals (Hostettmann and Marston, 1995; Hall and Walker, 1991), thus indicating the pesticidal potentials of *P. pellucide*. Tannins are widely classified as an antinutrient which affects protein digestibility and metal ion availability, but recent reports suggest that free or protein-complex condensed and hydrolysable tannins are more effective than small phenolics as antioxidants (Hagerman, 2002).

CONCLUSION

A result from this present study is an affirmation of the use of this plant in management of various ailments. The observed chemicals are responsible for its medicinal properties. The additive or synergistic action of these chemicals and their compounds at target sites associated with physiological process may be responsible for the beneficial effects exerted by *P. pellucida*.

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