

Chemical Constituents of Cowry (*Cypraea samplometa*)

O.I. Oloyede

Department of Biochemistry, University of Ado-Ekiti, Nigeria

Abstract: Perforated cowry shells (*Cypraea samplometa*) were tested for the presence of certain phytochemicals, minerals Proximate analysis were also determined. Cowry shells (dry weight) showed the presence of Alkaloid, Cardiac glycosides, Tannins and quinones. Chemical analysis revealed the presence of Calcium (91.35 ± 0.45 mg/100g) and Iron (47.52 ± 0.02 mg/100g) as well as Aluminum and Sodium in considerable quantities. Proximate analysis showed that it contained moisture content (0.22%), Ash content (76.30%), Crude fibre (7.27%), Crude protein (5.10%) carbohydrate (14.13%) and Crude fat (0.42%). The presence of some important phytochemicals and calcium in highest quantity explains the action of the cowry shells encountered in therapeutic uses and their involvement in pharmaceutical product. The extraction of bioactive agent of cowries shell is one of the most intensive area of natural product research.

Key words: Cowry shell, phytochemicals, natural product research

Introduction

Cowries generally belong to the member of mollusks and family of *Cypraeidae*, they are favourite of collectors because of their beautiful colours. The mantle is usually ornamented with papillae that provide camouflage and assist in respiration. The colour of the mantle some times matched the sponges it feed upon. (Harasewych, 1991). The Fascinating colour observed in cowries shell can be attributed to various chemical and structural features. Different colours of cowries are dependent on the presence or absence of aluminum compounds and the acidity of the soil (Helman, 2002). The abnormalities usually observed in cowries shell are overproduction of shell in the mantle.

Man has long been inspired by the graceful symmetry and colour of shells. Architecture use shell as design. Greeks and Romans used the shell as part of their building design and decoration (Hayward *et al.*, 1996; Hawkins, 2006). The usage of cowries as a type of currency was so strong that the first metal coin in the current Greek colony of Lydia, was introduced around 670BC. (Fish and Fish, 1996; Helman, 2002). Many pharmaceutical product have their origin in seashell. These include Paolin (a drug made from abalone juice) for effective inhibitor of penicillin resis substance. The extraction of bioactive agent of cowries shell is one of the most intensive area of natural product research today yet the field is far from exhaustive.

Cowries shells were used in many area of medicine, examples include deadly venoms of some cowries shells used to help victims of strokes and heart diseases and to produce a revolutionary new drug for chronic pain control (Helman, 2002). The cement of the carrier shell is used as a possible cement for bone fractures. Powdered Pearl's from shell are used as a

topical eye medicine and it has been scientifically proved to have some anti-inflammatory effect in painful condition called conjunctivitis and is also used as calcium supplement both for human and animal and is an inhibitor of cancer in mice (Helman, 2002). Report shows that 10% of all cowries had been investigated in detail for bioactive agent (Hayward *et al.*, 1996; Fish and Fish, 1996). The present study was undertaken to determine the bioactive compound that contribute to its therapeutic effect.

Materials and Methods

Perforated cowrie shells were purchased locally from the market at Agege, Lagos, Nigeria. The shells were properly washed with sterile water to remove foreign bodies like dust, dirt and insect larva which might have entered during the harvesting from the sea. These samples were broken into small pieces and sundried. Dried samples were grinded with an electric blender into powdery form. The powdered material was stored in a clean dry screw capped bottle at room temperature (37°C) Proximate analysis, mineral composition and phytochemical analysis were carried out on dried samples.

Proximate analysis were carried out according to the procedure of Association of official analytical chemistry (A.O.A.C., 1990)

Mineral composition: The samples were dry ashed at 550°C. The ash was boiled with 10 mL of 20% hydrochloric acid in a beaker and then filtered into a 100 mL standard flask. It was made up to the mark with deionized water. The minerals were determined from the resulting solution using Atomic Absorption spectroscopy (Pye unican Sp9 cambridge, UK).

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Phytochemical analysis: Phytochemical screening procedures carried out were adapted from the previous work on plant analysis (Sofowora, 1993).

Determination of alkaloids, 0.5g of the sample was weighed accurately and defatted with 5% ethyl ether for 15 mins. The defatted sample was extracted for 20 mins with 5.0 mL of aqueous HCL in a water bath. The resulting mixture was centrifuged at 3000rpm for 10min to remove filtrate (supernatant) 1.0 mL of the filtrate was treated with a few drops of Mayer's reagent and a second 1.0 mL portion was treated similarly with Dragendorff' reagent. Turbidity or precipitation with either of these reagents was taken as evidence for the presence of alkaloids (Harbone, 1973; Trease and Evans, 1996).

Test for Saponin: Ability of Saponins to produce frothing in aqueous solution was used as screening test for the sample 0.5g of dried extract was shaken with water in a test tube, frothing which persist on warming was taken as evidence for the presence of Saponins.

Test for tannins: 5.0g of dried extract was stirred with 10.0 mL of distilled water. This was filtered and ferric chloride reagent was added to the filtrate. A blue black precipitate was taken as evidence for the presence of tannins (Trease and Evans, 1996).

Test for anthraquinones: 5.0g of dried extract was shaken with 10.0 mL of benzene, this was filtered and 5.0 mL of 10% ammonia solution was added to the filtrate. The mixture was shaken and the presence of violet colour in the ammonia cal (lower) phase indicated the presence of free hydroxy anthraquinones (Trease and Evans, 1996).

Test for Cardiac glycosides: 0.5g of dried extract was dissolved in 2.0 mL of glacial acetic acid containing one drop of ferric chloride solution. This was then underlaid with 1.0 mL of concentrated H₂SO₄. A brown ring obtained at the interface indicated the presence of cardenolides.

Results and Discussion

Table 1 shows the proximate composition of perforated cowrie shells (*Cyprica samplomonita*). Moisture and Nitrogen content were found to be very low. However, result also revealed low fat, protein and fibre contents 0.42%±0.03; 5.10%±0.01 and 7.27%±0.01 respectively. This confirms that cowrie is not a good source of fat and protein which are nutritionally important. Carbohydrate is present in considerable amount (14.73%±0.08). The Ash content was found to be high (76.30±0.10). It is a reflection of the total inorganic matter present in a food sample and also indicates that perforated cowrie possess some minerals which are essential for good health.

Table 1: Proximate Composition of perforated cowrie (*Cyprica samplomoneta*) (% dry weight)

| | |
|------------------|------------|
| Moisture content | 0.22±0.11 |
| Ash content | 76.30±0.10 |
| Crude fibre | 7.27±0.01 |
| Crude protein | 5.10±0.01 |
| Nitrogen content | 0.82±0.02 |
| Carbohydrate | 14.93±0.08 |
| Crude fat | 0.42±0.03 |

Result represent mean±SD of two determinations

Table 2: Mineral Composition of Perforated cowries (mg/100g)

| Element | Values |
|-----------|------------|
| Calcium | 91.35±0.45 |
| Magnesium | 1.22±0.02 |
| Potassium | 0.24±0.01 |
| Aluminium | 30.82±0.68 |
| Sodium | 29.71±0.03 |
| Manganese | 5.40±0.10 |
| Iron | 47.52±0.02 |
| Zinc | 0.61±0.02 |

Results are mean ± SD of two determinations

Table 3: Phytochemical analysis data of unripe pulp of *Carica papaya* (dry weight)

| Test | Observation |
|-------------------------|-------------|
| Alkaloid | +ve |
| Glycosides/cardenolides | +ve |
| Tannins | +ve |
| Quinines | +ve |

Calcium is the most abundant mineral present in the perforated cowrie shells. The high content of calcium confirms its medicinal role in bone formation. It was reported that the cement of the cowrie shell can be used as a possible cement for bone formation (Fish and Fish, 1996) and are used as calcium supplement.

Iron, Aluminum and Sodium are found in reasonable amount (Table 2). Sodium is an extracellular cation involved in the regulation of plasma volume, acid-base balance, nerve and muscle contraction. High dietary sodium has been associated with hypertension. Iron is an important trace element in the human body. It plays crucial roles in haemopoiesis, control of infection and cell mediated immunity. The presence of these minerals contributes to its medicinal value.

The presence of phytochemicals like Alkaloids, Glycosides, Tannins, Saponins, Quinones in perforated cowrie shells, (Table 3) which are biologically important contributes to its value in many areas of medicine e.g in physiotherapy and pharmacy.

Cardenolides/Cardiac glycosides are known to be used in the treatment of congestive heart failure (Schneider and Wolfling, 2004).

Saponin inhibits Na⁺efflux and activate Na⁺-Ca²⁺ antiporter in Cardiac muscle. The increased influx of Ca²⁺ through this antiporter produces elevated cytosolic Ca²⁺ which strengthens the contractions of heart muscle and thereby reducing congestive heart failure. The

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presence of cardenolides contributes to the role of deadly venoms of some cowrie shells which are used today to help victims of strokes, heart diseases and produce revolutionary new drug for chronic pain control. Also powdered Pearls from shells are used as topical eye medicine. It has been scientifically proved to have some anti-inflammatory effect on conjunctivitis where the surface of the eye become red and sore. (Fish and Fish, 1996). This report confirms the presence of Alkaloids and Anthraquinones in cowry shells as shown in Table 3.

Conclusion: The present study has shown that cowry shells contain some minerals and secondary plant products which are of biologic importance. The reasonable level of sodium in cowry shell is desirable against the backdrop of reported health effects of high sodium intake. The presence of cardenolides or cardiac glycosides and saponin confirms its therapeutic effects on heart related diseases.

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