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Phytochemical, Proximate and Toxicity Studies of Aqueous Extract of C*rinum ornatum* (Toad's Onion)

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ABSTRACT

Crinum ornatum (Toad's onion) bulbs were analysed for its phytochemical and proximate composition. Toxicological test was also conducted on the water extract of the bulbs. Phytochemical screening revealed the presence of alkaloids, tannins, saponins, flavonoids, glycosides, cardiac glycosides, saponin glycosides, volatile oils and steroids. The results of the proximate analysis are expressed in percentage dry matter (mean ± standard deviation of three replicates);*Crinum ornatum* contains77.83 ± 2.75% moisture, 4.67 ± 0.58% ash, 0.67 ± 0.29% crude lipid, 4.04 ± 0.07% crude protein, 2.67 ± 0.29% crude fibre, 87.96 ± 0.46% available carbohydrate and 373.99kcal/100g energy value. The medium lethal dose (LD_{50}) of the bulbs' is higher than 3000mg/kg for the tested animals. The results indicate that, the bulbs can be considered as a spice that could serve as potential sources of flavouring agent with medicinal benefits.

Keywords: *Crinum ornatum*, Phytochemical, Proximate, Toxicity

INTRODUCTION

Crinum ornatum is known as Toad's onion or "*Albasar kwaadi"* in Hausa language of Nigeria as reported by Blench and Dendo (2007). The photograph of *Crinum ornatum* is shown in Figure 1.

Figure 1: The photograph of *Crinum ornatum* (Toad's onion)

Crinums are genus of about 180 species of perennial plants that have large flowers on leafless stems, and develop from bulbs(Crinum, 2009). They are found along the sides of streams and lakes in tropical and subtropical areas worldwide. Crinum leaves are basal, typically long and strap-shaped, with colours ranging from light green to green (Crinum, 2009). Shaw and Sheppard (2007) also described *crinums* as bulb-type plants related to the amaryllis (*Hippeastrum*) which have been grown in many gardens for decades.

*Crinum ornatum*bulbs were reported by Oloyede *et al.* (2010) that the isolated alkaloids (Lycorine, Crinamine, Heamanthamine, Hamayne and Ornamine) possess the antioxidant and anticonvulsant properties. Similarly, Oloyede and

Faronbi (2010) reported the antioxidant properties of the methanolic extract of the bulb of *Crinum ornatum.* Furthermore, the chemical composition and cytotoxicity properties of the essential oils isolated from *Crinum ornatum* bulbs were reported by Oloyede *et al.* (2010).

Moreover, *Crinum ornatum* bulbs are usually used by the traditional medicine practitioners in treatment of skin related diseases and it is grown for the purpose of demarcating farm lands in the rural areas of Sokoto state, Nigeria.

These studies provided information on the proximate and phytochemical composition of *Crinum ornatum* bulbs and also toxicological effects of its consumption, with the hope of its serving as medicinal benefits in human nutrition.

MATERIALS AND METHODS

Sampling and Treatments

The bulbs of *Crinum ornatum* (toad's onion) were purchased from Sokoto central market and transported in a polyethylene bag for identification at Botany unit, Usmanu Danfodiyo University, Sokoto. The epicarps of the bulbs were pilled off and separated from the stalks for easy assessment. The pilled bulbs were cut into smaller pieces and completely dried in an oven at 60 – 80^{o}C for 3 days. The dried bulbs were ground into powder with the aid of an electric blender.

Extraction method

Fifty grams (50 g) of the ground sample was extracted by soaking with 300 cm^3 of distilled water for 24 hours at room temperature, with shaking at certain intervals. The mixture was filtered and part of the filterate was used for phytochemical screening. A portion of the filtrate was preserved by drying in an oven at 60 – 80^{o}C for 2 days. The dried sample was used for toxicological analysis (Daniyan and Muhammad, 2008).

Phytochemical analysis

The qualitative test was carried out on the aqueous extract of the *Crinum ornatum*, using the methods of Harborne (1973), Trease and Evans(1989), Sofowora (1993) and El-Olemy*et al.* (1994), for the presence of alkaloids, tannins, saponins, flavonoids, glycosides, cardiac glycosides, saponin glycosides, volatile oils, steroids and anthraquinones.

Proximate analysis

Proximate analysis was carried out using the method of Bakare (1985) and AOAC (1990), which involves the determination of ash content, moisture content, crude protein, crude fibre and crude lipid. The carbohydrate content and the energy value of the sample were determined using the method reported by Umar *et al*. (2006).

Toxicological analysis

Lethal dose concentration (LD_{50}) determination on the aqueous extract of *Crinum ornatum* was carried out using the method of Organization for Economic and Cultural Development (OECD, 2001). Five (5) rats were used out of a population of ten (10) and each one of the rat was administered a single oral dose of 3000 mg/kg of aqueous extract of *Crinum ornatum* per one (1) kg body weight of the rat with a feeding tube and observed for 48 hours. This was repeated one after the other for all the rats. The remaining unused rats were administered with distilled water, respectively. Symptoms of toxicity such as increase or decrease in movement, loss of appetite and time of regaining it, body scratching, nervous sensation, salivation, depression and time of death were recorded. The number of survivors in each of the groups after 48 hours was recorded.

RESULTS AND DISCUSSION

The phytochemical screening result indicates the presence of all the tested phytochemical constituents except anthraquinones in the water extracts of *Crinum ornatum* as presented in Table 1.

Alkaloids were present in *Crinum ornatum.* This is in accordance with the result obtained by Machocho *et al.* (2004) on the water extract of the plant and has shown to possess medicinal properties. Similarly, *Crinamine* from *Crinum jagus* had been showed by Adesanya *et al.* (1992) to possess antibacterial activity. Saponins were observed in *Crinum ornatum.* This signifies its antibiotic properties because the report of Okwu and Emenike (2006) showed that saponins serves as a defensive mechanism against microbial attacks. Tannins were observed in *Crinum ornatum* and were reported by Okwu and Emenike (2006) to possess the property of hasten the healing of wounds. Similarly, flavonoids appeared moderately in *Crinum ornatum.* This signifies its protection against allergies, inflammation, platelets aggregation and microbial infections (Okwu and Omodimiro, 2005). Cardiac glycosides content were observed in *Crinum ornatum.* The report of Malik and Siddiqui (1981) showed that, Cardiac glycosides are used in treatment of congestive heart failure and cardiac arrhythmias. Saponin glycosides were observed in *Crinum ornatum.* This signifies its medicinal properties because the report of **Sharma** and Prasad (2010) showed that natural saponin glycosides could serve as free radical scavenger that has the ability of protecting against oxidative injury to bovine serum albumin (BSA). In addition, Friedli (2010) showed that saponin glycosides inhibits liver cell injury caused by many chemicals and is used in the treatment of chronic hepatitis and cirrhosis in Japan. It also inhibits the growth of several DNA and RNA viruses. Volatile oils were observed in *Crinum ornatum.* This signifies its

medicinal properties because the report of Johnston and Parsons (2010)showed that volatile oils could helps in prevention of high blood pressure, bacterial and viral infections and inflammation. Steroids were observed in *Crinum ornatum.* This signifies its contribution to the development of reproductive organs because some of these steroids include the male hormone testosterone and the female hormones estrogen and progesterone. Testosterone is responsible for many of the physical changes that occur to males during adolescence, such as deepening of the voice and increase in muscle mass. Even after adolescence, testosterone continues to influence a variety of male sexual and emotional processes (Steroids, 2009).

Table 1: Result of Phytochemical Screening of Aqueous Extract of *Crinum ornatum*

Test	Presence of Phytochemicals
Alkaloids	+++
Tannins	+++
Saponins	+++
Flavonoids	++
Glycosides	+
Cardiac glycosides	+++
Saponin glycosides	+
Volatile oils	+++
Steroids	+++
Anthraquinones	-

KEY: (+++) = Present in large amount. (++) = Present in moderate amount.
(+) = present in trace amount. (-) = Absence

Proximate composition is expressed in percentage dry matter. The result showed that *Crinum ornatum* contained 77.83 $\pm$ 2.75% moisture, 4.67 $\pm$ 0.58%ash, 0.67 $\pm$ 0.29%crude lipid, 4.04 $\pm$ 0.07%crude protein, 2.67 $\pm$ 0.29%crude fibre, 87.96 $\pm$ 0.46%available carbohydrate and 373.99kcal/100g energy vale as shown in Table 2.

The moisture content for the bulb of *Crinum ornatum* (77.83%) is higher than that of garlic 66.57, 67.66 and 73.86% as reported by Hussain *et al.* (2009), Odebunmi *et al.* (2010) and Hussain *et al.* (2010), respectively. High moisture content of a sample implies its poor storage quality because samples with moisture content more than 15% encourages microbial attacks during storage (Umar *et al.,* 2006).

The 4.67% of ash content for the bulb of *Crinum ornatum* is higher than that of onion (0.70%) reported by Odebunmi *et al.* (2007), but lower than 8.48% reported by Nwinuka *et al.* (2005).High amount of ash content implies the availability of essential minerals present in a particular sample (Umar *et al.*, 2006).

The crude lipid content for the bulb of *Crinum ornatum* (0.67%) is in agreement with 0.68% of the bulb of garlic reported by Nwinuka *et al.* (2005). Crude lipid in a sample enhances its energy giving value, as fat is broken down in the body by oxidation process with the release of energy; one gram of fat gives 37kcal of energy (Gaman and Sherrington, 1990).

The analysed *Crinum ornatum* with 4.04% of crude protein content is lower than 7.87% of garlic bulb (Odebunmi *et al.*,2010). Crude protein in a sample acts as an energy source and a tissue builder(Crude protein, 2010).

The crude fibre content for the bulb of *Crinum ornatum* (2.67%) is almost in agreement with 2.43% of garlic bulb as reported by Hussain *et al.* (2010) but higher than 0.73% of onion bulb as reported by Odebunmi *et al.* (2007). Although, high amount of crude fibre in a sample improves protection against constipation and it also have an effect on heart disease because studies have shown that soluble fibre lowers levels of artery-clogging cholesterol in the blood stream (Dietary Fibre, 2009).

The 87.96% of available carbohydrate content for the bulb of *Crinum ornatum* is higher than 73.22% of garlic bulb reported by Otunola *et al.* (2010) and 76.71% of onion bulb reported by Nwinuka *et al.* (2005). High amount of available

carbohydrate in a sample serves as a major energy source in the diet of animals (Carbohydate, 2010).

The energy value for the bulb of *Crinum ornatum* (373.99kcal/100g) appeared to be higher than 367.64 kcal/100g and 357.19kcal/100g of garlic and onion respectively reported by Nwinuka *et al.* (2005). The report of Sharma *et al.* (2002) showed that samples with higher energy value may contribute in giving energy; i.e. the energy value of food is a measure of the heat energy available by the complete combustion of a stated weight of the food.

Table 2: Result of proximate analysis of *Crinum ornatum*

Component	*Crinum ornatum*
Moisture (%WM)	77.83 ± 2.75
Ash (%DM)	4.67 ± 0.58
Crude lipid (%DM)	0.67 ± 0.29
Crude protein (%DM)	4.04 ± 0.07
Crude fibre (%DM)	2.67 ± 0.29
Available carbohydrate (%DM)	87.96 ± 0.46
Energy value (kcal/100g)	373.99

- Values are expressed as mean ± standard deviation of three replicates
- WM = Wet Matter
- DM = Dry Matter

The observable symptom of discomfort in the animals of group A-E administered with *Crinum ornatum* (3000mg/kg) aqueous extract are; loss of appetite but regained it after 15 minutes, slow movement, depression, less aggressive and lying at the corners of the cage. Similarly, no death was recorded as presented in Table 3. Therefore; these results showed that the medium lethal dose (LD_{50}) of *Crinum ornatum* is higher than 3000mg/kg for the test animals.

Clarke and Clarke (1979) showed that any sample whose the acute oral $LD_{50}$is above 1000mg/kg is regarded relatively safe. Similarly, WHO (1991) considered extract with LD_{50} above 3000 mg/kg is essentially safe. Therefore; the results of the acute oral LD_{50} of the bulb species for the aqueous extract of *Crinum ornatum* may be useful for consumption.

Table 3: Result of Acute Toxicological Study for the Aqueous Extract of the Bulb Species of *Crinum ornatum*

No. of rats	Extract of sample	Exceptional symptoms after sometime	No. of death
1-5	3000mg/kg	Appetite regained after 15 min and the rats were more aggressive	0
6-10	Dist. H_2O	None	0

CONCLUSION AND RECOMMENDATION

Considering the results of phytochemical screening, proximate analysis and toxicological studies of *Crinum ornatum* (toad's onion) bulbs, the plant could be considered as a potential source of spice. These would provide both flavouring and medicinal benefits when consumed. Although, more research should be carried out on the sub-chronic (long-time toxicity) in order to have a safe and profitable consumption.

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