Evaluation of 'Corchorus olitorius', Ùkùèrè a food condiment found in the Southwestern Nigeria: A Scientific and Cultural Significance

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1.0 ABSTRACT

The plant *Corchorus olitorius* (known locally as ùkùèrè) is a soup condiment highly valued in Akoko especially the Àbèsàbèsì speaking communities. There are four identified species within the communities namely: ùkùèrè, ùkùèrè ihuhu, ọ̀nánà and ewédú. Ùkùèrè and ewédú are usually cooked fresh, while ùkùèrè ihuhu and ọ̀nánà (a species of ùkùèrè) must be turned into powder before using them as soup condiments. The question is why do the people prefer *Corchorus olitorius* especially the dry one? What are the nutritional values in the plant? What does this suggest of the traditional African man in relation to his environment? The purpose of this research work is to answer the above questions by scientifically analyzing the antimicrobial properties, elemental composition, qualitative and **q**uantitative phytochemical constituent of (*Corchorus olitorius ọ̀nánà)* ethanolic and aqueous extracts from the leaves. It was observed that *Candida albicans and Klebsiella pneumonia* were most inhibited by both the ethanolic and aqueous leaf extracts of C. olitorius. The results indicate that *Corchorus olitorius* contains very important natural components of alkaloid saponin, cardiac glycoside and tannin. Findings reveal that the plant contains natural body building elements such as calcium and potassium; as well as the following proximate composition: ash, moisture crude protein, fat, fibre and carbohydrate that are very useful for healthy leaving. We conclude that the traditional African society is conscious of the health of her citizens and makes maximum use of her environment to achieve this health goal within the society.

KEYWORDS - Antimicrobial activity, phytochemical activity, proximate composition, elemental constituent, *Corchorus olitorius*, Àbèsàbèsì, culture.

1.2 INTRODUCTION

This research is motivated by the soci-biotechnological question on why Akoko people especially the Àbèsàbèsì people highly value *Corchorus olitorius* (*ùkùèrè)*, the dried type under investigation in this research as soup condiments. In each of the homogenous communities of Àbèsàbèsì linguistic group, especially the Èkiròmì, Ìluẹnì, Akpes, Ọ̀ṣùgù and some neighbouring Akoko communities, the plant is dried, made into powder for use at will for the family meal. It is accorded a social status of being special soup for entertaining guest in traditional ceremonies such as burial, marriage ceremonies and most commonly, it is prepared for a (new mother) woman who has just given birth to a child for the first 3 months[1]. On the day of the child's naming ceremony, the house is cleaned up, all the ash and the fire that had kept the room warm is packed by family members and well wishers. The cleaning ceremony is tag *tṣigíhugo* "rise from ashes" which is usually done by female relatives of the celebrants who rise up very early to clean the house and the environment. The room is also prepared for guest, visitors, and well wishers. Pounded yam with *ùkùèrè* (*Corchorus olitorius) soup* is made available for as many guests as care to have a taste. It is pertinent to state that the meal is always shared with neighbours and relatives by sending the soup made from C. *olitorius* to their homes as sign of celebration. In the culture, nobody rejects such food because everybody is expected to welcome a newly born baby by rejoicing with the parents. Sharing of meal is a sign of jubilation; therefore it is not common for anyone to reject such meal. Whoever rejects such meal is usually suspected of having bad intention.

As already mentioned, pounded yam with *ùkùèrè* (*Corchorus olitorius)* soup is a highly preferred meal within the communities. During celebrations indigenes at home and in diaspora prefer the meal. The lexical item, ùkùèrè is a common vocabulary in family menu discussion within the traditional setting. We therefore, conducted oral interview with some elderly persons in each community. One important information derived from the interview is that Corchorus olitorius has the ability to reduce the effect of alcohol and toxins in the body system[2]. The scientific prove of this claim and the nutritional value of the plant under investigation, which is, indeed, one of the many plants used in African societies for similar purposes is the focus of this paper.

Corchorus olitorius is one of the medicinal plants that have been identified and used throughout human history. Plants have the ability to synthesize a wide variety of natural compounds that performs important biological functions, including serving as anti-poison for human against attack from pests, reptiles, fungi, and carnivorous mammals as well as healing ailments. At least 12,000 such compounds have been isolated so far, a number estimated to be

[1] In the traditional setting, a woman delivered of a baby is kept in a room for seven to nine days. The room is constantly kept warm for the mother and the child. Older women in the family always go in to prepare food for the new mother. The food which is usually pounded yam and corchorus soup is always available for the mother and her guests.

[2] The question that was thrown on Agoyi as a native is *iní sa sà pé ùkùèrè a tṣi mí òtùtù àbí usag bong ọni yìí*? *Ẹ gi á tṣi mí ìwùdò je ọni ye* Meaning: don't you realize that corchorus reduces the intoxicative effect of alcoholics wine and palm wine on consumers? It also reduces/heals stomach pain. The question is what is the essential chemical compound in the plant that makes it effective?

less than 10% of the total available compounds (Tapsel et*al*., 2006; Lai and Roy, 2004). The use of plants as medicines predates written human history. Ethno-botany (the study of traditional human uses of plants) is recognized as an effective way to discover future medicines. In 2001, researchers identified 122 compounds used in modern medicine which were derived from plant sources, 80% of these have had ethno-medical use identical or related to the current use of the active elements of the plant. Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, these include aspirin, digitalis, quinine and opium (Fabricant and Farnsworth, 2001). In the next sub-section we will discuss the use of herbs remedies in Africa.

2.1 Herbs as Remedies in Human society?

Corchorus olitorius, commonly known as Nalta jute, tossa jute, Jew's mallow West African sorrel and bush okra, is a species of shrub in the family Malvaceae (Grubben, 2004). It is the primary source of jute fibre. The leaves and young fruits are used as vegetable, the dried leaves are used for tea and as a soup thickener, and the seeds are edible (Grubben, 2004). This popular vegetable in West Africa is rich in nutrients and also has a lot of health benefits which include protection from various diseases. *Corchorus olitorius* is an annual, branched herb which is 90-120 cm tall with glabrous stems. It's leaves measure 6-10 cm long, 3.5 – 5.0 cm broad, elliptic-lanceolate and apically acute. Flowers are pale yellow and the seeds trigonous black (Kirtikar and Basu, 1975). The claim of efficacy of the use of C olitorius plant by local people has no modern scientific backing. This study aimed at examining the antimicrobial and nutritive value of *C. olitorius* commonly used by the Akoko people of Ondo State as soup.

3.0 Materials and Methods

Plant collection /Source

Leaves of *C. olitorius* were obtained from Ikaram-Akoko, in the Southwestern part of Nigeria. The plant was authenticated by a certified botanist at the herbarium unit of Department of Plant Science and Biotechnology, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria. The leaves were washed thoroughly with distilled water, dried, pulverized and stored in air tight containers at room temperature prior to use (Vats et al, 2011).

Test organisms

The test bacteria used in this study were *Salmonella typhi, Klebsiella pneumoniae, Escherichia coli and Candida albican*. They were obtained from Adekunle Ajasin University, Akungba- Akoko, Ondo State, Nigeria.

3.1 Plant Extraction

Two hundred and fifty gram (250g) of dried plant material was weighed separately into conical flasks containing 750ml each of distilled water and ethanol. The mixtures were initially shaken rigorously and left for 3 days. All mixtures were filtered using sterile Whatman filter papers and the filtrates were collected directly into sterile crucibles. All filtrates obtained were introduced into sterile reaction tubes and heated continuously in water bath at the temperatures of 78^0C for ethanol extraction and 105^0C for distilled water. The residues obtained were kept at room temperature.

4.0 Standardization of extracts

Using aseptic condition, the extracts were reconstituted by adding 1.2g of each extract to 5ml of dimethylsulphoxide (DMSO) and 15ml of sterile distilled water producing a final concentration of 60mg/ml. This stock was further diluted with sterile distilled water to achieve concentration of 30, 15, and 7.5mg/ml (Osuntokun, 2014)

4.1 Standardization of Inoculum

Slants of the various organisms were reconstituted using an aseptic condition. With the aid of a sterile wire loop, one colony of each pure culture was transferred into 5ml of sterile nutrient broth and incubated for 24 hours. After incubation, transfer 0.1ml of the isolated colony using a sterile needle and syringe into 9.9ml of sterile normal saline contained in each test tube and then mixed properly. The mixture serves as inoculum containing approximately 10^6cfu/ml of bacterial suspension (El Astal *et al.,* 2005).

4.2 Antimicrobial Assay of Plants Extracts Using Agar Well Diffusion Method.

Antibacterial assays for the plant extracts were carried out by well diffusion technique. Standardized inocula that match the 0.5 McFarland standard was used for all susceptibility tests. The extracts were reconstituted accordingly into the following concentrations; 60, 30, 15 and 7.5mg/ml, using the Dimethyl Sulphoxide (DMSO). An 0.1 ml of the standard inoculums (equivalent to 10^6cfu/ml) was seeded into 20 ml of Muller-Hinton agar, mixed and poured into sterile Petri dishes and allowed to set. Using a sterile cork borer of 4 mm diameter, equidistant wells were made in the agar. Drops of the re-suspended, (0.5ml per well) extracts were introduced into the wells. Ciprofloxacin and Metronidazole 2mg/ml were used as positive control. The plates were allowed to stand on the bench for an hour, to allow pre-diffusion of the extracts before incubation at 37^oC for 24 hours. The zones of inhibition were measured to the nearest millimeter (mm) using a standard transparent meter rule. All experiments were performed in duplicates (Osuntokun, 2015; Osuntokun and Ayodele, 2014).

5.0 Determination of Bioactive Component (Phytochemical Screening), Minerals, Anti- nutrients and Proximate Composition of Plant Extracts.

Plant filtrates were prepared by boiling 20 g of the fresh plant in distilled water. The solution was filtered through a vacuum pump. The filtrates were used in the screening for flavonoids, tannins, saponins, alkaloids, reducing sugars, anthraquinones and anthocyanosides according to the methods described by Ahmedulla andNayar (1999), Edeoga *et al.,* (2005) and Ekpo and Etim (2009).

5.1 Proximate Analysis of *C. olitorius* aqueous extracts

The proximate parameters (moisture, dry matter, ash, crude fats, proteins and fibers, nitrogen, carbohydrates and energy values) were determined using Association of Official Analytical Chemists Methods and others described by Trease and Evans (1983), Husein et al (2011), Howirtz, (2003) and Alharrasi *et al*., (2012)

RESULTS

Table 1. Qualitative and quantitative analysis of phytochemicals present in C. *olitorius* extracts

Sample									
	Analysis	Alkaloid	Cardiac Gycoside	Steroid	Anathra-quinone	Phenol	Tannins	Saponin	Flavonoids
Ethanoic extract	Qualitative	+ve	+ve	-ve	+ve	-ve	+ve	+ve	+ve
	Quantitative	2.10	3.70	0.00	14.01	0.00	3,55	8.55	2.25
Aqueonium extracal	Qualitative	+ve	+ve	-ve	+ve	-ve	+ve	+ve	+ve
	Quantitative	2.10	3.70	0.00	14.01	0.00	3,55	8.55	2.25

From the table 1 above we see that six (6) among the important phytochemical substances were discovered. No steroid or phenols were detected. The yield of anthraquinone was 14.01 while for flavonoids it was found to be 2.25%. It was observed that all major phytochemicals were present in the crude extracts of *Corchorus olitorius*

Table 2. Quantitative analyses of minerals present in *Corchorus olitorius* extract (ug/100g)

Samples	Na	K	Ca	Mg	Zn	Fe	Pb	Cu	Mn	P
Corchorus olitorius Ethanolic Extract	10.29	18.56	11.70	20.65	19.55	6.72	ND	0.01	16.32	9.45
Corchorus olitorius Aqueous Extract	11.03	17.34	10.45	27.12	20.11	9.34	ND	0.04	17.32	5.35

On Table 2 above, it was observed that most elements were present at a very appreciable quantity in both crude ethanol and aqueous leaf extracts of *Corchorus olitorius* ,lead was not found in the crude sample.

Table 3. Quantitative analyses of proximate composition of *Corchorus olitorius* Extracts

S/N	% Ash	% MC	% CP	% Fat	% Fibre	%CHO
Corchorus olitorius Ethanolic Extract	10.32	7.10	16.45	6.10	10.99	40.20
Corchorus olitorius Aqueous Extract	10.78	7.00	14.68	5.19	14.23	42.99

Key: MC – Moisture content; CP – Crude protein; CHO – Carbohydrate

The quantitative analysis of proximate composition of crude C. olitorius leaf extracts showed that carbohydrate (CHO) was the highest component with 40.2% and 42.9% in ethanol and aqueous extracts respectively. Fats has the lowest value of 6.10 and 5.19% in both ethanol and aqueous leaf of C. olitorius respectively as shown in

Table 4. Antimicrobial activities of *Corchorus olitorius* ethanolic leaf extract

Zone of inhibition (mm)

	Aqueous				Ethanolic				Cipro	Metro
Organism/Conc.	60	30	15	7.5	60	30	15	7.5	30	30
E coli	10.0	5.0	3.0	2.0	10.0	7.0	2.0	1.0	22.0	0.0
Sal. typhi	8.0	5.0	2.0	1.0	12.0	7.0	3.0	2.0	20.0	0.0
K pneumonia	12.0	6.0	3.0	1.0	12.0	8.0	2.0	3.0	22.0	0.0
C albicans	10.0	8.0	5.0	4.0	14.0	9.0	4.0	3.0	0.0	20.0

The antimicrobial activities of crude *Corchorus olitorius* ethanolic leaf extracts at 60, 30, 15 and 7.5mg/ml concentration on selected entero- pathogenic microorganisms is shown in Table 4 above. It was observed that *Candida albican* has the highest zone of inhibition of 14mm at 60mg/ml concentration and *E.coli* has the lowest of 1.0mm at 7.5mg/ml concentration, while in the aqueous leaf extracts. *Klebsiella pneumonia* has the highest zone of inhibition of 10mm at 60mg/ml concentration and *Salmonella tyhi* has the lowest of 1.0mm at 7.5mg/ml concentration.

6.0. DISCUSSION

Medicinal plants are showing tremendous promise for preventive intervention in the pathogenesis of many diseases, as well as in their treatment (Atawodi, 2005), This study had used phyto-chemical, and microbial indices to evaluate the importance of C. olitorius, which is one of the major food condiment in the southwestern part of Nigeria. They are used in soups under the Arabic name "Molukhyia." In India, the leaves and tender shoots are eaten. Folk medicine reported it to be demulcent, deobstruent, diuretic, lactagogue, purgative, and tonic It is a folk remedy for aches and pains, dysentery, enteritis, fever, pectoral pains, and tumors (Duke and Wain, 1981). Ayurvedics use the leaves for ascites, pain, piles, and tumors. Elsewhere, the leaves are used for cystitis, dysuria, fever and gonorrhea. The cold infusion is said to restore appetite and strength.

6.1 SUMMARY OF FINDINGS

In summary, findings from our study reveal nine important medical essence of C. olitorius in the healthy living of the people. The the presumed health maintenance substance are listed below.

The proximate analysis of C.olitorus showed a low % of moisture content which is food for the storage of C. olitorius which is often dried and powdered before use. Moisture is known to favour microbial growth and encourage metabolic processor that will lead to earlier deterioration of the leaves (Hussian, 2009). The crude protein level is higher than reported for btoo most leafy vegetables which usually ranged between 1-7 % (Doi, 2012). This helps the body cells to rejuvenate just as the high carbohydrate content can serve as source of energy to the consumer, Fibers aids digestion and free bowel movement, in C olitorius, a fiber content of 14.23% confer some benefits to the commoner who rarely experience constipation.

Mineral analysis of C olitorius showed a wide range of zinc to copper ratio which can result to increase risk of cardiovascular system disorders. Their essential elements are required in trace. The low level of iron to overcome mistritronal deficiency of iron which often occur in bleeding and chronic infections.

Phosphorus helps to maintain blood sugar level, normal heart contraction and normal cell growth and repair, needed for cell growth. It has been reported to play vital role in maintaining the body's acid-alkaline balance.

Calcium which is present in C. olitrius has been reported to be a major component of the bones, human blood and extra cellular fluids that regulates cells permeability and functionality of cardiac muscles. (FAO/WHO, 1974).

The plant also attest saponin which is reported to have hypolipidemic and anti cancer activity. Zinc is a trace element needed in the body for essential biochemical functions.
Potassium is high in C. olitorous while Na is low, the low Na/K ration has been reported to lower the incidence of hypertension Choi, et al, 2011).
The plant also attests carbohydrate which serves as source of energy.

The test carried out indicates that the plant contains magnesium. Magnesium is medically reported to be useful in maintaining osmotic equilibrium in the plasma and extra cellular fluid. It prevents heart disorder and lowers blood pressure (Thomas and Krishna Kumari, 2015).

The antimicrobial activity of C. olitorus might be as a result of anthraquinone which binds irreversibly with nucleophilic amino acid of microorganism. Thereby making them unavailable hence loss of function will result: C. albican attested to have a prevalence rate of significant 16.5 to 23.3 among pregnant women was inhibited by the extracts of c.olitoru. Klebsiella pneumonia a major cause of pneumonia can equally be inhibited by both the ethanolic and aqueous extracts of c.olitorus. These show that apart from the shelter role, the leaves of C.olitorus can equally prevent bacteria infections especially among pregnant women with weakened immune system (Emeribe et al, 2015).

6.2. IMPLICATION OF THE FINDING

Human society particularly African in general and indeed Àbèsàbèsì maximize the natural the use of herbs in the environment one of such herbs is the ùkùèrè C.olitorus commonly known as ewedu in Yoruba. The members of the communities maximize the medical value of the herb for the treatment of expectant mother as well as the nursing mother and the child upbringing. In a conversation with a colleague after presenting this paper in a departmental seminal, I was made to understand that juice from C. olitorus help women in labour to easy and fasten the baby delivery. No wonder the ùkùèrè is a household lexical item within Àbèsàbèsì, Akoko and most African communities. For someone with poisonous infection the statement is "mi ùkùèrè tṣá u ngọ" meaning give him C. olitorus soup or juice. Two species of the herb, ùkùèrè ihuhu and ọ̀nánà are dried and made to powder to preserve it for use in dry season. It is pertinent to note that all these are conceived and processed in the brain through the language.

7.0 CONCLUSION

The contemporary African society is conscious of the health of its members. The environment is employed to maximize the advantage of the green leaves as well as plants for the healthy development and treatment of the members in the traditional way just as demonstrated in the Àbèsàbèsì maximizing the healing potentials inherent in *Corchorus olitorius* thou no orthodox scientific investigation was carried out yet, traditionally, they possess the knowledge of what is edible and useful for healthy living or otherwise.
It is therefore recommended that much consideration should be into *Corchorus olitorius* as it has so many usefulness much especially for treatment of infections. The use of *Corchorus olitorius* should be encouraged.

7.1 Recommendation

We suggest that the contemporary society should protect this plant and the like. The use of herbicide on the farm to control weed is detrimental to the continued existence of these plants. The plant if protected will continue to serve its inherent function of healing and protecting the people from ailments. In essence we recommend that the use of local herbs or medicinal plant in general should be encouraged by health practitioners, nutritionists and government agencies.

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