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Traditional and medicinal uses of *Luffa cylindrica* : a Review

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Luffa cylindrical, otherwise known as Sponge gourd is a fibrous plant with fruits containing black seeds. Luffa plant is a curcurbit with other members including snake gourd, pumpkins and cucumbers. It grows as a flowering annual vine with pollinated flowers developing into cylindrical green fruits filled with seeds in a system of many intertwined cellulose fibres. The fruit is edible especially when young and it contains group of compounds such as phenolics, lavonoids, oleanolic acid, ascorbic acid, a-tocopherol, carotenoids, chlorophylls, triterpenoids and ribosome-inactivating proteins, which makes it highly effective when used for medicinal purpose. Luffa cylindrical contains chemical components that have effects on hypersensitivity reactions, serve as immunostimulant, anti-inflamatory agent and function in glycosidase activity, inhibit protein synthesis with structural-function relationship of type I RIPs suggesting potentials for antitumour and antiviral activities, and also induce uterine contraction to hasten child birth (Oxytocics). In this report, the traditional and medicinal uses of Luffa cylindrica were explored and the shortcomings associated with its uses were highlighted and discussed.

Keyword: Luffa cylindrica, Phenolics, Lavonoids, Oleanolic Acid, Ascorbic Acid.

1. Introduction

Nature has provided a complete storehouse of remedies to cure ailments of mankind. Medicinal plants have been used for centuries as remedies for poisonous bites because they contain component of therapeutic values and has also been used to induce labour during child birth[1]. Traditional healing system plays an important role in maintaining the physical and psychological wellbeing of the vast majority of tribal people in India[1]. Traditional medicine include all kinds of folk medicine, unconventional medicine and indeed any kind of therapeutic method that had been handed down by the tradition of a community or ethnic group. Snake-bite is an important and serious medicolegal problem in many parts of the world, especially in South Asian countries[1]. Almost 80% of people in developing countries depend on traditional medicines for primary health care[1], most of which are derived from the plants. The village folk, especially the sugali tribal people are still using the natural resources available in their surroundings[1]. Ethnobotany, the interaction between plants and people involves traditional use of medicinal plants by indigenous communities and management of plant diversity by the aboriginals[2]. Traditional herbal medicine is readily available in rural areas for the treatment of snakebite. Application of the plant or its sap onto the bite area, chewing leaves and bark or drinking plant extracts or decoctions are some procedures used to counteract snake venom activity. Plants are used either single or in combination, as antidotes for snake envenomation by rural populations in India and in many parts of the world[3].

Medicinal plants have also be found useful in the treatment of infections caused by fungi, bacteria, viruses, parasites and certain clinical conditions [like cancer] occurring naturally or resulting from exposure to environmental contaminants[4]. Over 60% of people in Nigeria rural areas depend on traditional medicine for treatment of ailments[4]. Different plants have been used as a source of inspiration in the development of novel drugs[5]. Plant derived medicine are widely used because they are relatively safer than the synthetic alternatives, they are readily available, cheaper and work effectively with no side effect[6]. As a result of the use of medicinal plants in treatments, some of them have be found to have triterpenoids which comprise a large group of diverse C30 natural secondary metabolites having relatively complex cyclic structures, usually tetra or pentacyclic, although acyclic or monocyclic skeletons have also be found[7]. However, most of these plants contain alcohols, aldehydes, carboxylic acids or esters, which are regarded as an important class of compounds in Phytochemistry. Modern isolation and analysis techniques have refined the structural elucidation of many already isolated and also newly found compounds[7]. More than 40 skeletal types arising from the cyclisation and subsequent rearrangements of their biosynthetic precursor squalene has been distinguished. Most of the triterpenes, with the exception of those with hopane and gammacerane skeletons have a 3-oxygen function. The attachment of linear or branched sugar moieties to the triterpene framework, usually at the 3-hydroxyl position, results in the formation of a large number of naturally occurring saponins. Disubstitution or, less frequently, trisubstitution of the triterpenoid molecule with sugars is a regular feature for these compounds[7]. Triterpenoids are widely distributed throughout the plant kingdom. Oleananes and ursanes, which often occur together, and lupanes are found in a wide range of families. Lanostanes are common in fungi and marine organisms and also occur in higher plants. The remaining skeletal types are more restricted in their natural occurrence. Cucurbitanes occur in the Cucurbitaceae and they have also been detected occasionally in at least five other families, namely Begoniaceae, Cruciferae, Desfontainiaceae, Elaeocarpaceae and Scrophulariaceae[8]. Many plants [e.g. *Luffa cylindrica,* etc] belong to the family Cucurbitaceae found to contain cucurbitanes which is a type of triterpene.

Luffa cylindrica has been found to be a unique vegetable which also belongs to a family of cucumber and marrow and also known as a vegetable sponge or sponge gourd[9]. *Luffa* is a subtropical vegetable and widely cultivated in Asia, India, Brazil, and USA[9-11] but not shown to be cultivated in Nigeria. In addition to being used as edible vegetable, *Luffa* also finds a wide application in packing medium, shoes mats, sound proof linings, bath sponges, utensil cleaning sponges, adsorbent for removal of heavy metal [such as Nickel, Lead, Chromium, Copper, etc] in waste water, and immobilization matrix for plant, algae, bacteria and yeast[10].

Additionally, the luffin which was reported to be a ribosome- inactivating protein isolated from *Luffa* seed, has been shown to be effective against growth of parasites, protozoa, insects, fungi and HIV[12]. In a study dealing with the anti-inflammatory activity on macrophage cell, Bor and co-worker[13] compared 25 vegetables and found that fresh Daylily was the most efficient in inhibiting LPS-induced NO generation, followed by *Luffa*[13]. The presence of functional components like polyphenols in *Luffa* may be responsible for this effect[14]. There are several *Luffa* species present in nature, of which *Luffa acutangula*; the antiproliferative activity on leukaemia cells HL-60 has been reported[15]. However, the effect of *L. cylindrica* on biological activity like anti-inflammation remains unexplored.

Many polyphenols including p-coumaric acid, 1-O-feruloyl-b-Dglucose, 1-O-p-coumaroyl-b-D-glucose, 1-O-caffeoyl-b-D-glucose, 1-O-[4-hydroxybenzoyl]-glucose, diosmetin-7-O-b-D-glucuronide methyl ester, apigenin-7-O-b-D-glucuronide methyl ester and luteolin- 7-O-b-D-glucuronide methyl ester have been discovered in *Luffa* pulp [14]. Also, sponge gourd was shown to contain 20.74 mg/g of total phenolics, 17.94 mg/g of flavonoids, 0.5 mg/g of total anthocyanins, and 1.2 mg/g of ascorbic acid[15]. While in *Luffa* seed, both oleanolic acid and echinocystic acid were the major triterpene acids present[16], the variety and amount of triterpene acids in *Luffa* pulp and peel remain unknown[17]. Moreover, some other functional components like carotenoids and chlorophylls remain unexplored in *Luffa*. *Luffa* peel, a major waste produced during preparation of *Luffa* prior to cooking, also proved to be a vital source of functional components[17]. As a result of this fact, *Luffa* peel is likely going to be a promising raw material for possible future production of health foods[17]. *Luffa cylindrica* has been studied to contain Ribosome inactivating proteins [RIPs][18]. Ribosome-inactivating proteins [RIPs] are plant enzymes that depurinate the large ribosomal RNA [rRNA]. This modification renders the ribosome unable to bind elongation factor 2 [EF-2], thereby inhibiting the protein synthesis[19]. A diverse range of medicinal properties have also been associated with these RIPs; for example, they have been tested extensively for use as immunotoxins and anti-HIV agents and for their effects on protozoa, insects, and fungi[20]. Based on the structural properties and their corresponding genes, RIPs are classified into three types: Type I RIPs contain a single enzymatically active chain with molecular weights ranging from 26 to 31 kDa[21]. Type II RIPs are highly toxic heterodimeric proteins with an enzymatically active A-chain subunit and a lectin-like B-chain[21-22]. Each chain has a molecular weight of 30 kDa and is linked through a disulfide bond[23]. Type III RIPs consist of a single enzymatically active polypeptide, but, unlike type I RIPs, are synthesized as zymogens[24]. In addition to the aforementioned RIPs, small RIPs with a molecular weight of about or less than 10 kDa are by comparison much less well known and have been isolated only from bitter gourd seeds designated c-momorcharin[25], sponge gourd seeds designated Luffin P1[26], Luffin-S[27] and fresh brown pumpkin seeds designated α-moschin and β-moschin[28]. Amino acid analysis revealed that they have very unusual amino acid compositions and are characterized by a predominance of arginine and glutamate residues[29]. Luffin P1 is the smallest RIP with a molecular weight of 5226.8 Da. It displays a cell-free translation-inhibiting potency [IC_{50} = 0.88 nM], which is similar to those of types I and III RIPs but higher than those of type II RIPs[30]. Another group of investigators reported hIL2-Luffin P1 immunotoxin exhibits potent inhibitory activity on T-cell proliferation in vitro and significantly prolongs the survival of MHC-mismatched skin and renal allografts *in vivo*[31].

2.0 Analysis Of Functional Components In *Luffa* Peel And Pulp

Luffa cylindrica has been shown to contain some components which are responsible for its potency in treatment of diseases. The analysis based on the method of Kao and Chen[32] revealed that the *Luffa* peel water extract contained the largest amount of total phenolics, while the ethanol extract contained the highest level of total flavonoids. The *Luffa* peel ethyl acetate extract contained a greater content of oleanolic acid, carotenoid and chlorophyll than the other five extracts. Comparatively, the *Luffa* peel extract contained a higher amount of functional components than *Luffa* pulp[17].

2.1 Functional components in *Luffa* pulp and peel

Table 1 shows the various functional components in *Luffa* peel and pulp extracts. Among the various treatments, total phenolics were present in highest amount in water extract of peel [PW], followed by ethyl acetate extract of peel [PA], ethanol extract of peel [PE], ethyl acetate extract of pulp [AP], water extract of pulp [WP] and ethanol extract of pulp [EP][17].While for total flavonoids, PE was the most abundant, followed by PW, PA, EP, WP and AP[17]. Compared to *Luffa* pulp, *Luffa* peel contained a larger amount of oleanolic acid, especially in both PA and PE. Interestingly, no vitamins C and E were detected in all the *Luffa* peel and pulp extracts[17].

However, a level of 24.1 and 55.7 lg/g vitamin C was detected in fresh *Luffa* peel and pulp, respectively, whereas vitamin E remained undetected[17]. According to the data bank of food composition in Taiwan[17], fresh *Luffa* pulp was found to contain vitamin C at 60 lg/g. The absence of vitamin C in *Luffa* peel and pulp extracts indicated that this nutrient may undergo substantial loss during washing, freeze drying or extraction. Table 2 shows the contents of various carotenoids and chlorophylls in all the *Luffa* extracts. It was found that no carotenoids were detected in both PW and WP, which is due to their lipid-soluble nature. A total of five carotenoids, including 9- or 90-cisneoxanthin, all-trans-lutein, 9- or 90-cis-lutein, all-trans-b-carotene and 9- or 90-cis-b-carotene were detected in PA, with all-trans-lutein dominated. As most carotenoids are present in all-trans form naturally in plants, the formation of cis isomers is probably due to freeze-drying or extraction[33]. Comparatively, the total carotenoids were present at a much larger amount in PA than in the other five extracts. Also, *Luffa* peel was shown to contain higher level and more variety of carotenoids than *Luffa* pulp. A total of 12 chlorophylls and their derivatives were present in PA, in which both chlorophyll a and chlorophyll b dominated (Table 2)[17]. In addition, PA was shown to contain the largest amount of total chlorophylls, followed by PE, AP and EP[17]. This outcome implied that the low-polarity nature of chlorophylls was more readily extracted with less polar solvents like ethyl acetate. By comparing this with carotenoids, no chlorophylls were detected in water extracts of both *Luffa* peel and pulp [PW and WP]. It was further reported that, a much larger amount of chlorophylls was present in *Luffa* peel than in *Luffa* pulp. Also, both total phenolics and total flavonoids were the major functional components in water extract of peel [PW], while oleanolic acid, carotenoid and chlorophyll were the main bioactive compounds in ethyl acetate extract of *Luffa* peel [PA][17]. A similar outcome was reported by[34-35] showing that a higher level of total phenolics was in apple peel and Chinese jujube skin than pulp, respectively. It was postulated that phenolic compounds has been accumulated in the epithelial tissue of plants for protection against oxidative damage[36]. For triterpene acid, only oleanolic acid was detected in both *Luffa* peel and pulp extracts. However, in a similar study by Khajuria[16] reported the presence of oleanolic acid and echinocystic acid in *Luffa* seed. Apparently, echinocystic acid is mainly distributed in *Luffa* seed instead of *Luffa* peel or pulp. Nevertheless, the variety, growth environment and harvest season also affects distribution and kind of triterpene acid in *Luffa*. As pointed out by Guclu-ustundag and Mazza[37], oleanolic acid is more soluble in medium-polarity solvents, which should explain why a much larger level of oleanolic acid is present in ethyl acetate extract of *Luffa* peel [PA] (Table 1)[17].

Table 1: Contents of functional components (mg/g extract)[A] in different *Luffa* extracts.[B] [17]

Extract	Total phenolic[C]	Total lavonoids[D]	Oleanolicacid	Ascorbic acid	a-Tocopherol	Carotenoids	Chlorophylls	Total
PW	14.02±0.80a	16.74±0.50a	0.46±0.01c	ND	ND	ND	ND	31.22±1.31
PA	11.24±0.31b	7.21±0.00b	25.79±0.36a	ND	ND	14.87±1.42a	37.29±0.16a	96.40±2.25
WP	1.11±0.01e	0.22±0.00c	0.03±0.00d	ND	ND	ND	ND	1.36±0.01
EP	0.94±0.09e	0.33±0.00c	0.01±0.00d	ND	ND	0.01±0.00b	0.04±0.00c	1.33±0.09
AP	4.18±0.19d	ND[E]	0.15±0.00cd	ND	ND	0.65±0.02b	1.60±0.01b	6.58±0.22

PW: water extract of peel. **PE:** ethanol extract of peel. **PA:** ethyl acetate extract of peel. **WP:** water extract of pulp. **EP:** ethanol extract of pulp. **AP:** ethyl acetate extract of pulp

A Average of duplicate analyses±standard deviation.
B Symbols bearing different letters [a–e] in the same column are significantly different [$p < 0.05$].
C Data expressed as mg/g of gallic acid equivalent.
D Data expressed as mg/g of quercetin equivalent.
E Not detected.

Table 2: Contents of carotenoids and chlorophylls (lg/g extract)[A] in different *Luffa* extracts. [17]

	PW	PE	PA	WP	EP	AP
			Carotenoids			
9-or 90-cis Neoxanthin	ND	ND	ND	1403.4±35.7	ND	ND
All-trans-lutein	ND	431.3±63.5	9131.6±1180.1	ND	8.2±0.1	396.1±48.3
9-or 90-cis-Lutein	ND	32.4±1.1	366.6±73.8	ND	ND	38.9±4.7
All-trans-b-carotene	ND	216.5±16.7	2934.1±262.7	ND	ND	167.1±11.4
9-or 90-cis-b-Carotene	ND	55.2±2.3	1032.6±16.2	ND	3.2±0.3	45.9±8.4
Total	ND	735.5± 0.1		ND	11.4±0.0	648.0±0.0
			Chlorophylls			
Hydroxychlorophyl[b]	ND	7.4±1.6	355.4±17.3	ND	ND	0.5±0.3
Chlorophyll b	ND	573.8±26.8	5939.0±304.7	ND	12.8±0.0	345.8±7.7
Chlorophyll b´	ND	67.7±3.1	1232.7±62.9	ND	ND	30.4±1.0
15-OH-lactone chlorophyll a	ND	ND	81.4±2.0	ND	ND	ND
Hydroxychlorophyll a	ND	17.3±0.7	537.8±27.7	ND	ND	12.5±0.5
Chlorophyll a	ND	681.0±2.8	23952.9±506.5	ND	14.2±0.2	1038.4±18.1
Chlorophyll a´	ND	32.2±1.5	1491.0±86.4	ND	ND	51.0±1.4
Pheophytin b	ND	19.8±1.6	83.7±5.9	ND	ND	ND
Hydroxypheophytin a	ND	11.9±1.0	69.3±3.2	ND	ND	ND
Hydroxypheophytin a´	ND	7.4±1.6	46.4±1.6	ND	ND	ND
Pheophytin a	ND	529.4±27.8	2998.3±157.7	ND	17.8±0.0	108.9±1.3
Pheophytin a´	ND	53.3±10.4	500.2±16.5	ND	ND	17.4±0.2
Total	ND	2001.1±0.8	37288.1±156.3	ND	44.8±0.1	1604.9±6.3

PW: water extract of peel. PE: ethanol extract of peel. PA: ethyl acetate extract of peel. WP: water extract of pulp. EP: ethanol extract of pulp. AP: ethyl acetate extract of pulp.
[A] Average of duplicate analyses ± standard deviation.

The effects of Triterpenoids as one of the components of *Luffa cylindrica* are discussed under different subheadings stated below:

2.2 Effects of triterpenoids on hypersensitivity reactions

Adaptive immunity has the mission of defending an organism against microbial infections, but it also produces damage and disease **[38]**. Such is the case with hypersensitivity reactions, which are responses of the immune system against different agents or events, but in some cases, it cause an excessive response that is not controlled by the organism **[38]**. There are four types of hypersensitivity reactions **[38]**, of which the most relevant with regard to being treated with medicinal plants are type I or immediate hypersensitivity, which is due to IgE antibodies, and type IV, which is mediated by lymphocyte **[38]**. In the former, allergy is the most relevant clinical manifestation, with anaphylaxis, asthma, rhinitis, or eczema being common, while in the latter, delayed-type hypersensitivity and contact dermatitis are the most common manifestations**[38]**. Other diseases that can develop when lymphocyte-mediated hypersensitivity is implicated are rheumatoid arthritis, diabetes mellitus [insulin-dependent], multiple sclerosis, and inflammatory bowel disease**[39]**.

2.3 Immunostimulant effects of triterpenoids

Alis *et al.,***[40]** studied eight cycloartanes isolated from *Astragalus melanophrurius* [Fabaceae] and found that the compounds showed interesting immunomodulatory activity in an isolated human lymphocyte stimulation test. It was further revealed that astrasieversianins II and X; astragalosides I, II, IV, and VI; and cyclocanthosides E and G were all able to stimulate human lymphocyte proliferation in concentrations ranging from 0.01 to 10 g/mL. Behboudi *et al*.,[41-42] studied, the effects of a mixture of triterpenes from *Quillaja saponaria* [Rosaceae] on the production of IL-1 and IL6, as well as their role in the activation of APC, a prerequisite for the development of immune responses were reported. This was shown that in such cell-mediated immune responses, IL-6 synergizes with IL-1 to promote T cell proliferation and both the differentiation of T helper cells and the development of T cell-mediated cytotoxicity by CD8+ cells. Therefore IL-1 constituted a second signal for T cell activation, in this case provided by APC, which carries the first signal produced by the MHC class II molecules. After its release, IL-1 up regulates the activity of T helper cells. For its part, cytokine IL-6 is a key factor in cytolytic T lymphocyte generation, which is an important effector mechanism elicited by the immunostimulant complex [iscom]-borne antigens. Of the possible combinations of triterpenoids, including QH-A, QHC, and spikoside, a semipurified Quillaja saponin product, all of which are mixtures of saponins, It has been shown that there is an increase in QH-A as opposed to QH-C increased the capacity to activate APC. From *Luffa cylindrica* [Cucurbitaceae], Khajuria *et al.,*[16] isolated and studied the immunomodulatory activity of oleanolic acid and echinocystic acid in which both compounds increased the phagocytic index and showed stimulatory effects on macrophages, increasing both humoral and cell-mediated immune responses.

2.4 Saponnins

They constitute a well known group of triterpene which are bioactive compounds generally considered to be produced by plants to counteract pathogens and herbivores. Besides their role in plant defense, saponins are of growing interest for drug research as they are active constituents of several folk medicines and provide valuable pharmacological properties[43]. Accordingly, much effort has been put into unraveling the modes of action of saponins, as well as in exploration of their potential for industrial processes and pharmacology[43]. However, the exploitation of saponins for bioengineering of crop plants[43] with improved resistances against pests as well as circumvention of laborious and uneconomical extraction procedures for industrial production from plants is hampered by the lack of knowledge and availability of genes in saponin biosynthesis[43]. Although the ability to produce saponin is rather widespread among plants, a complete synthetic pathway has not been elucidated in any single species[43].

An overview of the traditional importance of anti-inflammatory triterpenoids in pharmacognosy gives rather poor results unless saponins are included. However, diverse crude drugs containing triterpenoids in the combined form of saponins have been used extensively for their anti-inflammatory properties, not only in folk medicine but also in modem clinical therapeutics. Aesein, a mixture of oleanane triterpene saponins with a yield of about 13% relative to the crude drug weight, shows anti-inflammatory action, and it is administered orally for clinical use[44]. Among Oriental medicinal remedies are many herbal drugs, such as ginseng or saiko, which contain triterpene saponins as their principal constituents and the ones that seem to be responsible for their efficacy[45]. Ginseng, from the root of *Panax ginseng* has been well known in East Asian countries since ancient times as a panacea drug that favours longevity. It contains oleanolie acid and dammarane triterpene saponins called ginsenosides with diverse pharmacological properties including anti- inflammatory activity[46]. The root of the *Bupleurum* species has been used in China as a traditional remedy for inflammatory diseases [45]. The main constituents of this drug are oligoglycosides of oleanane triterpenes called saikosaponin a-f. Saikosaponins cause a reduction in histamine secretion and enhance the anti-inflammatory actions of glucocorticoids[46-47]. It has recently been reported that the saikosaponins present in Heteromorpha trifoliata, which are structurally related to those of *Bupleurum falcatum* (saiko in Japanese), have anti-inflammatory activity. One in vivo study concluded that the isolated saikosaponins act by a mechanism close to that of steroids, but do not involve the glucocorticoid receptor[48].

3.0 Ribosome-Inactivating Proteins [Rips]

These are mainly present in plants and function to inhibit protein synthesis through the removal of adenine residues from eukaryotic ribosomal RNA [rRNA][49]. They are broadly classified into two groups: type I and type II. Type I RIPs are a diverse family of proteins comprising a single polypeptide chain, whereas type II RIPs are heterodimeric glycoproteins comprising an A-chain [functionally equivalent to a type I RIP] linked via a disulphide bond to a B chain, mediating cell entry[49]. Of the two types discussed earlier (type I and type II), only typeI RIPs (α-luffin) [50] have been reported to be present in Luffa cylindrical.

3.1 Medicinal Plants Used In The Induction Of Uterine Contractions [Oxytocics]

Some medicinal plants have been used in inducing labour during childbirth [51]. Most common methods used in the preparation of the medicine are by squeezing, it can also be boiled, while the most common method of administration of herbal medicines is by giving infusions orally [51]. Those plants claimed to be oxytocics are used to induce and maintain labour, help to remove the retained placenta, regulate post-partum bleeding and as abortifacient [51]. They increase the spontaneous activity of the uterus causing increase in contractions [52]. Medicinal plants used to speed birth are usually taken towards the end of gestation period or at the onset of labour pains [52]. Plants that produce uterine contractions have similar mode of action as that of oxytocin hormone produced on the posterior lobule of the hypophysis, which stimulates the uterus to experience strong contractions, thus producing labour[53]. The traditional birth attendants, mothers-in-law, mothers, or the expecting mother herself [self-medication] mainly prescribe these herbal remedies to induce labour. Some of these medicinal plants are also fed to cows and goats in labour[51]. Some traditional healers use these herbs to make a local medicinal capsule called "Emumbwa [51]", made from clay mixed with the herbs to form capsules, then dried for use at any time when a woman is in labour. Special containers made of clay are used to crush the capsule and mix with water for oral administration [51]. Emumbwa is widely used in commercial centres, towns and big cities where plants that can be used to quicken birth are not easily obtained, hence a business for the traditional birth attendants (TBAs) and other herbal medicine vendors, who live in towns and cities [52]. It was also reported that if such oxytocic plants are used during the first months of pregnancy, they could induce an abortion which was observed with some medicinal plants such as *Vernonia amygdalina* Del[51]. *Luffa cylindrica* seeds were reported to be abortifacient[54-55]. The ethno pharmacological studies reflecting these medicinal plants used in childbirth or for inducing abortion imply that some of these plants can hasten childbirth hence are probably oxytocics. Some plants used by TBAs may also have harmful effects when taken in larger quantities than required, this results into death of the unborn baby and/or rupturing of the uterus[52]. The fact that almost all plant species used to induce labour are administered orally has far reaching implications to the mother and the unborn child, including the death of the mother in case of wrong dosages.

Fig1: *Luffa cylindrica* plant

4.0 Shortcomings

Further studies should be carried out specifically to examine the relationships between high maternal mortality and high dependence on herbs during child birth; a positive linkage is suspected and requires further research. Although the chemical extracts of Luffa Cylindrica have generally been examined for their anti-inflammatory and antiviral properties, their possible use as immunosuppressant drugs should be considered for future research. In addition, new paths of investigation should be pursued, including studies on their effects on transcriptional pathways as well as their implication in immune responses. Several structural groups of triterpenes have demonstrated specificity against transcriptional factors; these could be of particular interest in treating inflammation, cancer, and immune diseases.

Since many women in some part of the world depend on the use of this traditional medicine to induce labour, the dilemma can lie in the toxicity and the unspecified dosages that may threaten the life of the unborn baby and the mother. Therefore may be need to carry out more study on the plant extract in order to evaluate its toxicity level at different concentration. Immunosuppressant drugs for this plant should also be considered for future research. There is need to carry out more experiment so as to have clearer understanding on the physiological role of triterpenes. There is need to have clearer understanding of the physiological role of triterpenes in Luffa cylindrica. There is also the need to devise a preservation method for its fruit without sun drying in order to make it available throughout the year and still remain viable.

5. Conclusion

Luffa cylindrica as a medicinal plant has been widely employed in treatment of many diseases and used in proffering solutions to clinical problems relating to child birth. Although to many communities where this plant is used, little did they know about the secret of its potency. Scientific research has shown the presence of some chemical components and proteins in Luffa cylindrica, and many others, which made it possible for them to be used as potentially effective chemical agent in health care delivery. Thus, possibility of transforming the chemical agents implicated in the plant of study into synthetic drugs to combat endemic diseases such as cancer and HIV should be the next focus of the clinical scientists.

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