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Aframomum Melegueta (Grains of Paradise)

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ABSTRACT

Aframomum melegueta is an herbaceous plant consumed as an edible spice and traditionally used to treat common ailments in Nigeria, such as body pains, diarrhea, sore throat, catarrh and rheumatism. Based on current research, different parts of the plant possess specific secondary metabolites such as flavonoids, phenolic compounds, alkaloids, tannins, Terpenoids, saponins, and cardiac glycosides that have healing potential and medicinal and therapeutic purposes. It has polyphenolic content flavonoids; which is comparatively high to other African spices Aframomum melegueta has the ability to lower body fat percentage, and decreased waist-hip ratio without any harmful side effects..

The uses of Aframomum melegueta (Grains of Paradise) appears to limitless ranging from the treatment of cancer, diabetic and inflammation. The purpose of this review of geared toward an eye open to Aframomum melegueta (Grains of Paradise) it limitless efficacy and therapeutic abilities as a new tread of natural antibiotics for the developing country like Nigeria, which is less expensive and very available as a source for the treatment of infection

INTRODUCTION

Aframomum melegueta (Grains of Paradise) is a spice with a similar composition as Ginger that belongs to the same *Zingiberaceae* family. It is used in Nigeria, West Africa. *Aframomum melegueta* (Grains of Paradise) has being in used for the treatment of infectious diseases such as urinary tract infections caused by *Escherichia coli*, *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Staphylococcus saprophyticus*, *Proteus mirabilis*, methicillin-resistant *Staphylococcus aureus*, *Salmonella* spp, and *Shigella* spp. It shows some promise in fat-mass control at doses possibly consumable in food products and medicinal concoction (Moret, 2013).

Aframomum Melegueta (Grains of Paradise) has different names such as grains of paradise, Atare (in Yoruba), chitta (Hausa), or Guinea pepper, is one seed with many healing power and its benefits to mankind seems endless. *Aframomum melegueta is an* herbaceous perennial plant native to swampy habitats along the West African coast of Nigeria. Its trumpet-shaped, purple flowers develop into 5 to 7 cm long pods containing numerous small, reddish-brown seeds. melegueta pepper, and alligator pepper, aframomum melegueta is among the species that belong in the ginger family Zingiberaceae. It is most abundantly in the countries of Ghana, Liberia, Ivory Coast, Togo, and Nigeria (Inegbenebor 2009).

The taxonomical classification of the plant is as follows: Plantae (kingdom), Tracheophyta (phylum), Liliopsida (class), Zingiberales (order), Zingiberaceae (family), *Aframomum* (genus) and *Aframomum melegueta* (species). This plant can grow up to 1.5 m in height with orange-coloured lips and pinkish-orange upper flowers that can develop into fleshly and indehiscent pods. The size of the pods are 5-7 cm in length, are edible and contain numerous small, reddish brown seeds (Figure 1) with a pungent scent of ginger and cayenne pepper. The stem bark is short and covered with scars of fallen leaves. The leaves are about 30 cm long, 12 cm wide, and have close nerves underneath (Ilic *et al*., 2010). The leaves average 35 cm in length and 15 cm in width, with a well-structured vascular system. The flowers of the herbaceous plant are aromatic, with an orange-colored lip and rich pinkish-orange upper part. The fruits contain numerous, small, golden red-brown seeds,

Aframomum melegueta (Grains of Paradise) means different things to different people. It is

served along with Kola-nuts to guests for entertainment in Igbo land. It is a common ingredient in pepper soup, a spicy delight in most parts of West Africa, Nigeria. The *Aframomum melegueta* (Grains of Paradise) plant has both medicinal and nutritive values and the extracts of its seeds has been used as an antidote to dysentery and diarrhoea. It is an effective herb for the treatment of snake bite. (Villarreal,*et al*,. (2010).

Figure1. *Aframomum melegueta*

A common condiment in West Africa,Nigeria, has been used as a spice for meats, sauces and soups. Traditionally, *Aframomum Melegueta* is mixed with other herbs for the treatment of common ailments such as body pains, diarrhoea, sore throat, catarrh, congestion and rheumatism in West Africa,Nigeria (Ajaiyeoba & Ekundayo, 1999). It is a perennial herbal plant that is cultivated because of its valuable medicinal and pharmacological effects such as antimicrobial, hepato-protective, anti-cancer and anti-diabetic effects (El-Halawany *et al*., 2014; Mohammed *et al*., 2017; Ngwoke *et al*., 2014).

With reference to the current literature, *Aframomum melegueta* contain 6-Gingerol, 8-Gingerol and Methyl-6-Gingerol, 6-Shogaol,6- and Rac-6-Dihydroparadol,6-Gingeredione,2-(5-butylfuran-2-yl) ethyl}-2-methoxyphenol, While 6-Paradol is said the active ingredient among these composition of *Aframomum melegueta* extract, further studies on *Aframomum melegueta* have reported its 6 paradol chemical constituent to be biologically significant beyond its medicinal value. For one, it has been found to foster weight loss by promoting faster body metabolism.

Cancer-battling antioxidants, flavonoids, have been found in relative abundance in *Aframomum melegueta* (Doherty *et al*., 2010). Flavonoids are commonly reported to possess anti-carcinogenic and anti-mutagenic effects (Aranganathan & Nalini, 2013) in which they interfere with the development of malignant tumors by inhibiting the expression of mutant genes, inactivating carcinogens and enzymes that are involved in the activation of pro-carcinogens, as well as activating enzymatic systems that are involved in the detoxification of xenobiotics (Bravo, 1998).

Flavonoids also inhibits the initiation, promotion and progression of tumours (Okwu, 2005; Urquiaga & Leighton, 2000). Quercetin, a flavonoid which can decelerates the development of tumours (Clifford *et al*., 1996), it was also found to be present in the *Aframomum melegueta* extract (Adefegha & Oboh, 2012). Although past studies have suggested that flavonoids isolated from various plants are effective against cancer cells, there is limited work on flavonoids isolated from *Aframomum melegueta*.

In a previous study, evidence showed that *Aframomum melegueta* extracts were effective against pancreatic cancer (Dibwe *et al*., 2012). Other supporting evidence includes a study by Kuete *et al.* (2011) who showed that the *Aframomum melegueta* extract exerted significant inhibitory activities on human pancreatic cancer and leukaemia cell lines.

Phytochemical investigations of *Aframomum melegueta* revealed the presence of (-)-buplerol, (-)-arctigenin, (E)- 14-hydroxy-15-norlabda-8(17), 12-dien- 16-al, labda-8(17),12-dien-15,16-dial, 16-oxo-8(17),12(E)-labdadien-15-oic acid, 5-hydroxy-7-methoxyflavone and apigenin in the extract. Among the list, (-)-arctigenin and (-)-buplerol showed the capacity to trigger apoptosis in pancreatic cancer cells (Dibwe et al., 2015).

The anti-cancer ability of *Aframomum melegueta* may not be attributed to flavonoids alone but Paradols, common plant phenolic compounds, are also found to exert anti-cancer effects by inducing apoptosis in human pro-myelocytic leukaemia (HL-60) cells. The effect is due to the presence of a vanillyl moiety and ketone functional group in the compound. Additionally, paradols can also suppress tumour promotion of the skin *in vitro* (Chung *et al*., 2001).

In addition to its repertoire of therapeutic effects, *Aframomum melegueta* may also prove its worth in combating metabolic disorders such as Type 1 and 2 diabetes. In this condition, the body resists the physiological effect of insulin. Therefore, too much insulin will remain in the blood for extended periods of time, causing the pancreas unable to secrete more insulin to control the glucose level in the blood (Gastaldelli, 2011).

A myriad of compounds found in *Aframomum melegueta* such as 6-paradol, 6-shagaol, 6-gingerol, oleanolic acid and acarbose exert an anti-diabetic effect by inhibiting enzymes such as α-amylase and α-glucosidase. These enzymes are responsible for digestion and break down of the carbohydrates and polysaccharides from food into simple sugars to increase blood glucose levels. Among the compounds, 6-gingerol and oleanolic acid are more effective in inhibiting the enzymes (Mohammed et al., 2017). *Aframomum melegueta* is suitable for consumption by diabetic patients, its consumption will help a diabetic patient stay healthy (Venugopal, ((2012). *Aframomum melegueta* extract has been known to reduce fat (weight loss) and even relieve painful arthritis when it is used as a massage oil (essential oil from plant like olive and citrus oil) (Odetunde *et al*., 2015).

The ethanolic seed extract and stem bark of *Aframomum melegueta* contains phytochemicals such as tannins, saponins, flavonoids, steroids, terpernoids, cardiac glycosides and alkaloids that possess antimicrobial and anti-inflammatory effects (Doherty *et al*., 2010; Okwu, 2004). Okoli *et al*. (2007) it provides the evidence that the methanolic *Aframomum melegueta* extract and its fraction contained alkaloids, glycosides, tannins, flavonoids, sterols and resins, with alkaloids and tannins as the major compounds as the active ingredient. *Aframomum melegueta* seeds contains terpenoids, alkaloids, flavonoids, tannins, cardiac glycosides, saponin and phenolic compound which are natural antioxidant. They scavenge for free radicals and offer protections against viruses, allergens, microbes, platelet aggregation, tumors, ulcers and hepatotoxins (chemical liver damage) in the body. The fruit pulp surrounding the seeds is eaten, or chewed as a stimulant. The root is a pungent, stimulant that benefits the digestion and relieves spasms (Odetunde *et al*., 2015).

To support this claim of anti inflammation properties of *Aframomum melegueta* , Ilic *et al*. (2014) reported that the ethanolic *Aframomum melegueta* extract inhibited cyclooxygenase-2 (COX-2). Compounds that inhibit COX-2 activity are capable of reducing inflammatory responses (Seibert & Masferrer, 1994). The most active COX-2 inhibitory compound in the *Aframomum melegueta* extract was [6]-paradol, while [6]-shogaol was found to inhibit expression of a pro-inflammatory gene, interleukin-1 beta (IL-1β) (Osuntokun *et al*,. 2017). *Aframomum melegueta* crude extract and its active ctompounds [6]-paradol, [6]-gingerol and [6]-shogaol significantly reduced inflammation in rats from the result collected during the research use for this recent review.

In another study utilising the aqueous seed extract of *Aframomum melegueta*, sub-chronic inflammation was induced by formaldehyde or nystatin, while chronic inflammation was induced by carrageenan in rats. The results revealed that *Aframomum melegueta* extract significantly reduced oedema induced by formaldehye and nystatin. Furthermore, it reduced the exudate induced by carrageenan (Umukoro & Ashorobi, 2005). Daily Ingestion of *Aframomum melegueta* noted that the higher dose was able to prevent an increase in liver weight and fully abolish lipid peroxidation as assessed and preserving both GSH and GST; hepatic superoxide dismutase (SOD) was not significantly influenced by *Aframomum melegueta* The increase in serum AST and ALT was also fully normalized.

Another lesser-known finding is the *Aframomum melegueta* on blood cell production. When the

methanolic seed and leaf extract of *Aframomum melegueta* was administered to 2,4-dinitrophenylhydrazine-induced anaemic rats, the treatment shows an increase in haemoglobin levels and platelet count, indicating its erythropoietic potential in treating anaemia (Omoboyowa *et al*., 2017). In other words, higher doses of the extract have previously been observed to be haematotoxic (Akpanabiatu *et al*., 2013), and thus the administered dose should be selected with caution because of its toxicity.

The appropriate dose of *Aframomum melegueta* extract depends on several factors such as the user's age, health, and several other conditions. At this time there is not enough scientific information to determine an appropriate range of doses for. Keep in mind that natural products are not always necessarily safe and dosages can be important.

A decoction of *Aframomum melegueta* is taken internally in the treatment of a range of disorders including painful menstruation, excessive lactation, postpartum haemorrhage (excessive bleeding during giving birth to a baby) and infertility. The seeds and leaf of *Aframomum melegueta* can be crushed and used for preparing concoctions for treating and healing wounds. (Alligator pepper) contains a high amount of tannin that is distinguished by its stringent property and as such it is very effective for healing wounds, treating burns and soothing inflamed mucous membrane. The seeds extracts of the alligator pepper can be used for treating gastrointestinal disorders such as stomach pain, diarrhea, ulcer and intestinal worms.

The seeds of *Aframomum melegueta* can be crushed and used for preparing concoctions for treating and healing wounds. Alligator pepper contains a high amount of tannin that is distinguished by its stringent property and as such it is very effective for healing wounds, treating burns and soothing inflamed mucous membrane. The aqueous extract of *Aframomum melegueta* is analgesic in nature and as such can be used for relieving and alleviating pains such as joint pain, toothache, stomach pain, arthritic pain and rheumatoid pain. Nigerian Journal of Physiological Sciences in 2009, researchers have reported that large doses of afromomum melegueta may pose a potential health risk on pregnant women who are in their first trimester of pregnancy. On the other hand, there was no report of any adverse side effect for men

Aframomum melegueta stem bark extract can be used for preparing herbal remedy for treating infectious skin diseases such as measles, chickenpox and smallpox. Due to its stimulating properties and peppery pungent taste, the *Aframomum melegueta* is normally chewed as a stimulant to keep the body alert. The leaves are used for preparing herbal medicines for preventing and treating malaria. The roots can be harvested throughout the year and used fresh or dried for later use. *Aframomum melegueta* seeds also have a stimulant action on the digestive system, strengthening and warming the stomach. They are used to alleviate indigestion, flatulence and bloating and help to relieve abdominal discomfort due to colic or griping.

In conclusion, *Aframomum melegueta has been found to be with no or very minimal side effects.* According to the Food and Drug Administration (FDA), *Aframomum melegueta* is included in their list of botanicals that are generally accepted as safe. People with known hypersensitivity to ginger or cardamom should take or use of *Aframomum melegueta* with caution. Also, cases of drug-herb interactions have not been reported yet up to date.

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