



Research Article

The impact of gongronema latifolium leaf extract on the immunological stability and membrane potential of albino rats

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Abstract

The purpose of this study was to ascertain the impact of immunological stability (measured by CD4 + T cell and CD8 + T cell counts) and membrane potential (MP) in albino rats fed leaf extract from *Gongronema latifolium*. Materials and Procedures: Seven albino rats were randomly assigned to each of the two groups (n = 7); group 1, or Control (C), was fed only regular food. For 28 days, 150 mg/kg of *Gongronema latifolium* leaf extract was given to Group 2. The Nernst equation was used to establish the membrane potential level, and the flow cytometric approach was used to quantify the amounts of CD4 + T cells (μl/count) and CD8 + T cells (μl/count). Albino rats given 150 mg/kg of *Gongronema latifolium* leaf extract had significantly higher levels of membrane potential, CD4+ T cells, and CD8+ T cells than the control group (P < 0.05). Conclusion: *Gongronema latifolium* leaf extract-fed albino rats showed higher membrane potential, CD4 +, and CD8 + T cell counts, which may indicate that the immunological characteristics and membrane potential of the rats are stable.

Keywords: Immune stability, effect, albino rats, membrane potential, *Gongronema latifolium*.

Introduction

The medicinal plant *gongronema latifolium* has a variety of therapeutic applications. Commonly called as "utazi" by the Igbo, "arokeke" by the Yoruba, or "utasi" by the Efik/Ibibio, the tropical plant *Gongronema latifolium* is found throughout West Africa, particularly in Nigeria [1]. It belongs to the Asclepiadaceae family and is a common vegetable, spice, and medicinal plant. Its soft, broad leaves and climbing behaviour make it a typical appearance in both fields and residential gardens [2].

The scientific name for it is *Gongronema latifolium* Benth. The family is Apocynaceae (formerly Asclepiadaceae). In traditional diets, the leaves are used as a vegetable in soups and sauces or as a bitter spice. The plant is commonly consumed raw or cooked, or used in herbal infusions. In addition to its culinary uses, it holds great importance in ethnomedicine [3].

Gongronema latifolium contains a variety of bioactive compounds, including alkaloids, glycosides, flavonoids, tannins, terpenoids, and saponins. These compounds are mostly responsible for its therapeutic properties. *G. latifolium* extract has been shown to significantly reduce blood glucose levels in animal models of diabetes. Because it increases pancreatic β-cell function and insulin sensitivity, it is a viable choice for controlling diabetes [4]. Due to the inclusion of polyphenols and flavonoids, it has potent antioxidant qualities that scavenge free radicals and reduce oxidative stress, two aspects that are crucial in preventing chronic diseases [5]. The leaf extract has been associated with better lipid profiles and reduced blood pressure by raising HDL and lowering triglycerides, LDL, and total cholesterol. Due to its antioxidant and membrane-stabilizing properties, extracts from *G. latifolium* protect the liver from harm caused by chemicals. Because the plant exhibits inhibitory activities against a range of bacteria and fungi, it can be used to treat wounds, infections, and gastrointestinal problems [6]. Because they lessen inflammation, the flavonoids and saponins in the leaves may be useful in the treatment of inflammatory conditions like arthritis. Some research suggests that the plant may boost male fertility by improving sperm quality, although caution is advised because some big doses may have detrimental effects [7].

Despite *Gongronema latifolium*'s widespread use in traditional medicine, dosage is crucial. High dosages may be hepatotoxic or detrimental to reproduction, and there is limited data on long-term safety in people. Its safety profile must be confirmed by controlled studies and clinical trials [8]. *Gongronema latifolium* is a potent nutraceutical with several health benefits. Its inclusion in traditional diets and increasing scientific support present it as a potential candidate for the development of plant-based medicines. More clinical study is required to fully establish dose, efficacy, and safety for routine medical use [9]. Thus, it is required to investigate the effects of extracts from *Gongronema latifolium* on the membrane potential (MP) and immunological stability (CD4 + T cell, CD8 + T cell counts, and the CD4/CD8 ratio) in male albino rats. The health advantages of *Gongronema latifolium* have been investigated recently, with a focus on its effects on immunological function and associated factors [10]. Although there is little concrete data connecting *Gongronema latifolium* ingestion to CD4+ T-cell counts, the plant's abundant nutritional composition raises the possibility of immune system support.

In nutrition, *gongronema latifolium* is commonly used as a spice. Because of their widespread usage in traditional medicine and nutrition, it is vital to examine their effects in this study [11]. Thus, the goal of this study was to ascertain how *Gongronema latifolium* extract affected the immunological stability (counts of CD4 + T cells and CD8 + T cells) and membrane potential (MP) of male albino rats.

Material and Methods:

Plant material and extraction

The leaves of *Gongronema latifolium* were purchased from the Ekenuwa market. It was discovered and verified at Imo State University Owerri's Department of Plant Biology and Biotechnology. Before being used, they were cleaned, sun-dried, and ground into a powder. For the extraction, the dried *Gongronema latifolium* leaves were ground into a coarse powder. A 400 g percolator containing 250 mL of distilled water was used to macerate the powder. After filtering, the mixture was let to stand for 48 hours. After the filtrate was put in an oven to evaporate, the solid residue known as extract was collected. For the experiment, the extract was prepared in distilled water at the proper quantities. As a result, 150 mg concentrations were made.

Experimental design

In this study, albino rats weighing 180–300 g were acquired from Imo State University's Animal House. For a week to acclimatise, the animals were housed in cages in a room with a 12-hour light-dark cycle and room temperature. The animals were divided into two experimental groups, each consisting of seven rats, at random. Fourteen albino rats (n=7) were split into two groups at random; Control (C) was given only regular food. 100 mg/kg BW of *Gongronema latifolium* leaf was given to Group 2.

Oral administration of the extract was used in all groups. Oral coercion was used to provide this treatment. Throughout the trial, food and water were freely available to all animals. The duration of this was 28 days. Following the collection of the blood samples, the membrane potential (MP) and immunological stability (counts of CD4 + T cells and CD8 + T cells) were assessed.

Blood collection

Chloroform vapour was used to anaesthetise the animals, who were then promptly removed from the jar and slaughtered. Each animal's heart was punctured to extract its whole blood, which was then transferred into dry, clean test containers. After allowing the blood in the dry, clean test tubes to coagulate for approximately fifteen minutes, the serum was extracted from the clot by spinning it for five minutes at 10,000 g in a Westfuge centrifuge (Model 1384).

Biochemical Assay

By applying the Nernst Equation, the MP was calculated. Using the flow cytometric technique, the CD4 + and CD8 + T cells were identified within two hours of collection.

Statistical analysis

The results were expressed as mean+ standard deviation. The statistical evaluation of data was performed by using student T- test.

Results:

Table 1: The level of membrane potential and immune status in albino rats fed with *Gongronema latifolium* leaf and control.

Parameters	Group 2	Group 1 Control	P value
Membrane Potential(J)	139.09±10.22	242.11±23.5	0.020*
CD4+ T cells (µl/count)	311 ± 59	701± 134	0.008*
CD8 +T cells (µl/count)	352± 43	641 ±90	0.016*

Discussion

The primary way that *Gongronema latifolium* leaves benefit health is through antioxidants, carotenoids (like lutein and beta-carotene), and phenolic compounds, which scavenge free radicals in the body to combat oxidative stress and may reduce the risk of chronic diseases like cancer and heart disease [12]. Furthermore, *Gongronema latifolium* has essential nutrients that promote overall health and wellness, including as fibre, iron, and folate [13]. MP levels were significantly greater in the *Gongronema latifolium*-fed rats in this study than in the control group. The greater nutritional value of *Gongronema latifolium* is probably the cause of this [14]. This increase in MP might be linked to a decrease in free radicals. This vegetable has been shown to have many health benefits [15].

Gongronema latifolium may improve eye health, lower oxidative stress, and prevent cancer and heart disease. *Gongronema latifolium* contains the antioxidant alpha-lipoic acid (ALA). ALA may enhance insulin sensitivity, lower blood sugar, and prevent changes brought on by oxidative stress, according to studies conducted on animals and in the lab. This may have a greater impact on the membrane potential. The stability of membrane potentials in biological systems is enhanced by the antioxidative, antiproliferative, and anti-inflammatory properties of *Gongronema latifolium* leaves, which include flavonoids among other active substances [16].

Furthermore, research has been done on *Gongronema latifolium*'s potential immunomodulatory advantages, specifically its impact on the CD4⁺ T-cell count, a critical measure of immunological function. Compared to the control group, albino rats with 150 mg/kg body weight exhibited significantly greater numbers of CD4⁺ and CD8⁺ T cells. This is in line with earlier reporting. The significant increase in CD8⁺ T cells in group 2 rats raises the possibility of better survival. Although it is not a direct treatment for increasing the CD4 level, *Gongronema latifolium* can be incorporated into a nutritious, immune-boosting diet. *Gongronema latifolium*, a nutrient-dense leafy green vegetable, is well known for its beneficial immune-boosting qualities. It contains essential vitamins, minerals, and bioactive compounds that affect immunological parameters in different ways. The numerous health benefits associated with ingesting *Gongronema latifolium* are due to its immunological stability.

Included in a balanced diet, *Gongronema latifolium* provides a number of essential elements that work synergistically to support immunological health [17].

Gongronema latifolium's nutritional composition supports immune system maintenance and function, even if it may not directly increase CD4⁺ T-cell counts on its own. *Gongronema latifolium* affects several biological processes, including detoxification, immunological control, gut microbiota balance, anti-inflammatory mechanisms, and antioxidant defence. When combined, these mechanisms enhance cellular function, protect against chronic diseases, and fortify the immune system [18]. This demonstrates the significance of *Gongronema latifolium* for membrane stability and immunity.

Conclusion

Membrane Potential, CD4⁺, and CD8⁺ T cell counts were significantly enhanced in albino mice with *Gongronema latifolium* leaf extract. This could suggest that the immune system is more robust and that the membrane potential is steady.

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