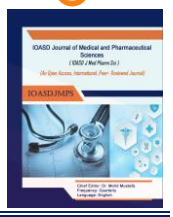
OPEN ACCESS

IOASD Journal of Medical and Pharmaceutical Sciences

IOASD J Med Pharm Sci, Vol-2, Iss-1, Jan-Mar., 2025
Frequency: Quarterly
ISSN: 3049-0294 (Online)
ISSN: 3049-3773 (Print)
Homepage: https://ioasdjmps.com



Immunomodulatory Potencies of Albino Rats Administered with Cinnamon (*Cinnamomum zeylanicum*) Bark Extract

Chinedu-Madu Jane Ugochi[1*] and Nnodim Johnkennedy[2]
[1]Faculty of medical laboratory science, Federal university Otuoke, Bayelsa State
[2]Department of Medical Laboratory Science Imo State University Owerri

Corresponding Author: Chinedu-Madu Jane Ugochi
Faculty of medical laboratory science, Federal university Otuoke, Bayelsa State.

DOI: 10.67224/ioasdjmps.2025.v02i01.008

ABSTRACT

The purpose of this study was to ascertain the impact of interleukin 6, CD4 + T cell, and CD8 + T cell counts in albino rats that were fed bark extract from *Cinnamomum zeylanicum*. 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, Group 2 received 20 mg/kg/day of bark leaf extract from *Cinnamomum zeylanicum*. The ELISA method was used to measure the level of Interleukin 6, and the flow cytometric approach was used to measure the levels of CD4 + T cells (µl/count) and CD8 + T cells (µl/count). Albino rats fed 20 mg/kg of bark extract of *Cinnamomum zeylanicum* bark had significantly higher levels of Interleukin 6, CD4 + T cell, and CD8 + T cell counts than the control group ($P < 0.05$). The higher levels of Interleukin 6, CD4 + T cells, and CD8 + T cells in albino rats fed bark extract from *Cinnamomum zeylanicum* may indicate that Interleukin 6 and immunological parameters are strengthened in albino rats. The aqueous cinnamon bark extracts successfully strengthen the immune system, it may be inferred.

Key words: Interleukin 6, Interleukin 6, CD4 + T cell, CD8 + T cell counts albino rats, *Cinnamomum zeylanicum* bark extract.

Original Research Article

Article History
Received: 11-01-2025
Accepted: 24-02-2025
Published: 03-03-2025

INTRODUCTION

Cinnamon has long been believed to be a very good source of iron, calcium, magnesium, and dietary fibers. In addition to being used as a spice and flavoring, cinnamon bark is used to treat toothaches, improve colon health, and prevent bad breath. *Cinnamomum zeylanicum* is a coagulant that stops bleeding, promotes tissue regeneration and blood circulation in the uterus, and has anticancer properties [1].

The tropical tree known as *Cinnamomum zeylanicum*, or cinnamon, is bushy and evergreen. Younger trees have smooth, pale bark, whereas older trees have brittle, brownish bark. The bark of cinnamon has several fragrant and therapeutic uses. It has antifungal, antibacterial, and antioxidant properties. Additionally, the cinnamon bark has substances that lower cholesterol, prevent cardiovascular disease, reduce inflammation, lower blood sugar, fight cancer, and fight bacteria [2].

The extract of *Cinnamomum zeylanicum* bark includes a number of components that may combine to improve other food items, in addition to a significant quantity of a specific mineral that aids in the catalysis of specific enzymes, the preservation of homeostasis, and immunological function. It is essential to investigate the biochemical effects of these plant compounds in order to ascertain their anticipated effects on their subjects [3].

Therefore, it is required to investigate the effects of bark extracts from *Cinnamomum zeylanicum* on the immunological stability (counts of CD4 + T cells and CD8 + T cells) and Interleukin 6 of male albino rats. The health advantages of *Cinnamomum zeylanicum* bark have been investigated recently, with a focus on the effects on immune function and associated parameters [4]. Although there is little concrete data connecting spinach diet to CD4+ T-cell counts, the nutrient-dense nature of spinach raises the possibility of immune system support. In nutrition, cinnamonomum bark 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 [5].

Cinnamomum bark (Lauraceae), also referred to as cinnamon, is one spice that is frequently used as a flavoring agent. Apart from its use as spice, it is shown

to possess a wide range of pharmacological effects such as antidiabetic, hypolipidemic, antibacterial and antifungal activities. In Nigeria, it is also often held that cinnamon is a powerful immune system enhancer and that combining cinnamon with honey fortifies the immune system [6]. There are no scientific studies that show how administering cinnamon bark affects the immune system. The present study was undertaken to evaluate the effect of the administration of *Cinnamomum zeylanicum* bark onInterleukin 6, CD4 + T cell and CD8 + T cell counts.

Therefore, this research aims to explore the effect of aqueous extract of cinnamon bark on Interleukin 6, CD4 + T cell and CD8 + T cell counts, in rats

MATERIAL AND METHODS

Plant Material and Extraction

The *Cinnamomum zeylanicum* bark leaves were bought from Ekenuwa market. It was identified and confirmed in the Department of Plant Biology and Biotechnology of Imo State University Owerri. The dried *Cinnamomum zeylanicum* bark were milled to get a coarse powder used for the extraction. The powder was macerated in a 400 g percolator with 250 mL of distilled water. The mixture was allowed to stand for 48 hours after it was filtered. The filtrate was then placed in an oven to evaporate and the solid residue was referred to as extract. The appropriate concentrations of the extract were made in distilled water for the experiment. Hence, the 20 mg concentrations was prepared

Experimental Design

The albino rats weighing (180-300 g) obtained from the Animal House of Imo State University were used in this investigation. The animals were kept in cages in a room and maintained at room temperature with a 12-hours light dark cycle for one week to acclimatize. The animals were randomly assigned to two experimental groups with seven rats in each group.

Fourteen albino rats were randomly divided into two groups (n=7); Control (C) received normal feed only. Group 2 was administered with *Cinnamomum zeylanicum* bark 20 mg/kg BW. In all groups, the extract was administered through oral route. This treatment was performed by oral compulsion. All animal were allowed free access to food and water throughout the experiment.

This lasted for 28 days. The blood samples were collected and the level of immunological stability (CD4 + T cell, and CD8 + T cell counts) and Interleukin 6 were then measured

Blood Collection

The animals were anaesthetized with chloroform vapour, quickly brought out of the jar and sacrificed. Whole blood was collected by cardiac puncture from each animal into clean dry test tubes. The blood in the clean dry test tubes was allowed to stand for about 15minutes to clot and further spun in a Westerfuge centrifuge (Model 1384) at 10000 g for 5 minutes, serum was separated from the clot

Biochemical Assay

The interleukin 6 was determined by calculation using the ELISA. The CD4 + and CD8 + T cells were determined within 2 h of collection using the flow cytometric method.

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 Interleukin 6 and immune status in albino rats fed with *Cinnamomum zeylanicum* bark leaf and control.

Parameters	Group 1	Group 2	P value
Interleukin 6 (pg/ml)	22.98±4.99	11.34±4.2	0.000*
CD4+ T cells (µl/count)	508 ± 71	332± 102	0. 000*
CD8 +T cells (µl/count)	556± 41	371 ±65	0.000*

DISCUSSION

C. zeylanicum polyphenol extract has been found to affect immune responses by regulating anti- and pro-inflammatory and GLUT gene expression in mouse macrophages provide health benefits. Additionally, spinach contains vital nutrients [7].

In this study, rats fed *Cinnamomum zeylanicum* bark had a considerably higher level of interleukin than the control group. This is most likely related to *Cinnamomum zeylanicum*'s higher nutritional value [8]. Reduced free radicals may be connected to this rise in interleukin. Numerous health benefits of this plants have been demonstrated [9].

Furthermore, research has been done on *Cinnamomum zeylanicum*'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 20 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, Cinnamonomum zeylanicum can be incorporated into a nutritious, immune-boosting diet [10]. *Cinnamomum zeylanicum*, a nutrient-dense plant, is well known for its beneficial immune-boosting qualities. It includes minerals, and bioactive compounds that have a variety of impacts on immunological parameters [11].

The numerous health benefits associated with ingesting *Cinnamomum zeylanicum* are due to its immunological stability [12.13]. A healthy diet can include Cinnamonomum zeylanicum, which provides a number of essential elements that work synergistically to support immune health. *Cinnamomum zeylanicum*'s nutritional composition supports immune system maintenance and function, even if it may not directly increase CD4+ T-cell counts on its own. Spinach affects several biological functions, including detoxification, immune control, gut microbiota balance, anti-inflammatory properties, and antioxidant defence [14,15]. When combined, these mechanisms enhance cellular function, protect against chronic diseases, and fortify the immune system [16,17]. This demonstrates the significance of spinach for membrane integrity and immunity.

CONCLUSION

Albino rats given spinach leaf extract showed markedly higher levels of Interleukin 6, CD4 +, and CD8 + T cell counts. This may indicate that the Interleukin 6 is stable and that the immune system is strengthened.

REFERENCES

1. Singh N., Rao A. S., Nandal A., Kumar S., Yadav S. S., Ganaie S. A., and Narasimhan B. (2021). Phytochemical and pharmacological review of *Cinnamomum verum* J. Presl-a versatile spice used in food and nutrition, *Food Chemistry*. 338, 127773.
2. Khan A, Safdar M, Ali Khan MM, Khattak KN, Anderson RA. (2003). Cinnamon improves glucose and lipids of people with type 2 diabetes. Diabetes Care 26: 3215–8.
3. Gilani S. and Najafpour G. (2022). Evaluation of the extraction process parameters on bioactive compounds of cinnamon bark: a comparative study, *Process Biochemistry (Barking, UK)*. 114, 93–101
4. Morsi DS, Barnawi IO, Ibrahim HM, El-Morsy AM, El Hassab MA, Abd El Latif HM. (2023). Immunomodulatory, apoptotic and anti-proliferative potentials of sildenafil in Ehrlich ascites carcinoma murine model: In vivo and in silico insights. Int Immunopharmacol. 119:110135.
5. Aldayel TS, Gad El Hak HN, Nafie MS, Saad R, Abdelrazek HMA, Kilany OE. (2023). Evaluation of antioxidant, anti-inflammatory, anticancer activities and molecular docking of Moringa oleifera seed oil extract against experimental model of Ehrlich ascites carcinoma in Swiss female albino mice. *BMC Complement Med Ther. 14*;23(1):457.
6. Ranasinghe L, Jayawardena B, Abeywickrama K. (2002). Fungicidal activity of essential oils of *Cinnamomum zeylanicum* (L.) and Syzygium aromaticum (L.) Merr et L. M. Perry against crown rot and anthracnose pathogens isolated from banana. Lett Appl Microbiol 35: 208–211.
7. Ghazanfari T, Hassan ZM, Ebrahimi M. (2002). Immunomodulatory activity of a protein isolated from garlic extract on delayed type hypersensitivity. Int Immunopharmacol 2: 1541–1549.
8. Gokhale AB, Damre AS, Saraf MN. (2003). Investigations into the immunomodulatory activity of Argyreia speciosa. J Ethnopharmacol 84: 109–114.
9. Asiimwe J. B., Nagendrappa P. B., Atukunda E. C., Kamatenesi M. M., Nambozi G., Tolo C. U., Ogwang P. E., and Sarki A. M. (2021). Prevalence of the use of herbal medicines among patients with cancer: a systematic review and meta-analysis, *Evidence-based Complementary and Alternative Medicine*. 18, 9963038
10. Sadeghi S., Davoodvandi A., Pourhanifeh M. H., Sharifi N., ArefNezhad R., Sahebnasagh R., Moghadam S. A., Sahebkar A., and Mirzaei H. (2019). Anti-cancer effects of cinnamon: insights into its apoptosis effects, *European Journal of Medicinal Chemistry*. 178, 131–140,
11. Jayathirtha MG, Mishra SH. (2004). Preliminary immunomodulatory activities of methanol extracts of Eclipta alba and Centella asiatica. Phytomedicine 11: 361–365. Kamath JV, Rana AC, Chowdhury AR (2003): Pro-healing effect of *Cinnamomum zeylanicum* bark. P*hytother Res 17*: 970 – 972
12. Larasati Y. A. and Meiyanto E(2018) ., Revealing the potency of cinnamon as an anti-cancer and chemopreventive agent, *Indonesian Journal of Cancer Chemoprevention*. 9, no. 1, 47–62,
13. Usta J, Kreydiyyeh S, Barnabe P, Bou-Moughlabay Y, Nakkash-Chmaisse H. (2003). Comparative study on the effect of cinnamon and clove extracts and their main components on different types of ATPases. *Hum Exp Toxicol 22*: 355–362.
14. Wijeweera A. A., Hewage J. W., Jayasinghe G. G., Wadumethrige S. H., Hettiarachchi S. R., and Wijesinghe K. G. G. (2022). Maturity dependence of quality, quantity and chemical constituents of bark and leaf oil of Ceylon Cinnamon (*Cinnamomum zeylanicum* Blume), *Ruhuna Journal of Science 11*, no. 1,
15. Klejdus B. and Kováčik J. (2016). Quantification of phenols in cinnamon: a special focus on “total phenols” and phenolic acids including DESI-Orbitrap MS detection, *Industrial Crops and Products*. *83*, 774–780,
16. Dvorackova E., Snoblova M., Chromcova L., and Hrdlicka P. (2015). Effects of extraction methods on the phenolic compounds contents and

antioxidant capacities of cinnamon extracts, *Food Science and Biotechnology*. *24*, no. 4, 1201–1207.
17. Madhushika K. T. S. and Bulugahapitiya V. P. (2022). Variation of bioactive secondary metabolites in Ceylon cinnamon (*Cinnamomum zeylanicum* Blume) in different climatic conditions, maturity status and propagation types, *Journal of Agriculture and Value Addition*. 5, no. 1.
18. Bernard D., Kwabena A., Osei O., Daniel G., Sandra A., and Elom S. (2014). The effect of different drying methods on the phytochemicals and radical scavenging activity of Ceylon Cinnamon (*Cinnamomum zeylanicum*) plant parts, *European Journal of Medicinal Plants*. 4, no. 11, 1324–1335.