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ASSESSMENT OF PHYTOCHEMICAL DIFFERENCES BETWEEN TWO COCOYAM VARIETIES GROWN IN PORT HARCOURT

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Abstract: The transfusion transmitted Cytomegalovirus (TTCMV) may complicate the frequent pRBC transfusion in βthalassemia major (Choobineh et al., 2009). The possibility of CMV transmission in these patients was looked up as the units of blood were neither screened for this infection nor leukoreduced. The aim of this study was to detect the seroprevalence of CMV infection in transfusion dependent thalassemia patients and its relation with the molecular study. A total of 123 children and adolescent; 50 normal and 73 were patients with β-TM on regular blood transfusion. A blood sample was taken from each individual, controls and pre-transfusion patients, and submitted to serological (ECLIA) and molecular (real tine PCR) study. The prevalence of CMV IgG specific antibody was 100% in both patients and control while no one of them showed reaction to CMV IgM specific antibody. The CMV IgG avidity index was high in all β-TM patients except for one patient (1.3%) showed low IgG avidity index, while all the control individuals (100%) have had high IgG avidity index. The viral DNA was not detected in the peripheral blood of the entire study sample detection,

Keywords: Cytomegalovirus, Multiple transfusions, Beta-Thalassemia major

1. Introduction

Cocoyam is a monocotyledonous, herbaceous, perennial and vegetatively propagated plant of the family Araceae. This family is characterized by its morphological diversity, the presence of many forms of calcium oxalate crystals, and flowers with a spadix of small, bisexual, or unisexual flowers, covered by a spathe (Henriquez *et al*. 2014; Matthews 1995). In Nigeria, the term "cocoyam" pertains to two varieties of edible aroid plants, specifically *Colocasia esculenta* (L.) Schott and *Xanthosoma sagittifolium.* Africa is the major producer of cocoyam, with West and Central Africa, notably, Nigeria, Ghana, and Cameroon contributing to over 60% of the total African production (Onyeka, 2014). According to Falade and Okafor (2014), Nigeria is the largest producer of cocoyam in the world with an annual production of 3.450 million metric tonnes in 2012, representing 72.2 %, 57.7 % and 45.9 % of total production in West Africa, Africa and the World respectively. Cocoyam is a rich source of carbohydrates and serve as a staple food for over 400 million people in the tropics (Djeugap *et al*., 2014).

Colocasia esculenta and *Xanthosoma sagittifolium* are two distinct, yet closely related root crops belonging to the Araceae family, both of which are widely cultivated in tropical and subtropical regions (Gelleh *et al*., 2018). *Colocasia esculenta* is typically characterized by its large, heart-shaped leaves and corms that have a smooth, brown

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skin with a starchy, white or purple-tinged flesh (Moorthy, 2004). In contrast, *Xanthosoma sagittifolium* has arrow-shaped leaves with corms that are generally larger, rougher, and more fibrous, with a flesh that ranges from white to yellow (Manner, 2011). Both plants are significant in traditional diets, offering a rich source of carbohydrates, dietary fiber, and essential micronutrients, making them vital for food security in many regions (Lim, 2015). Despite their similarities, they differ in their cultivation requirements, with *C. esculenta* preferring wetter, lowland conditions and *X. sagittifolium* thriving in drier, upland areas (Manner, 2011).

Phytochemicals are the plant derived chemicals possessing numerous herbal & medicinal properties. Medicinal plants with important bioactive compounds play a significant role in meeting the global healthcare needs. In fact, eighty percent of African populations use some form of traditional herbal medicine, and the worldwide annual market for herbal products approaches US$ 60 billion (Gunjan *et al*., 2015). Through phytochemical screening one could detect the various important compounds which could be used as the base of modern drugs that curing various diseases (Nilofer *et al*., 2013). Cocoyam possesses a range of biologically active phytoconstituents such as flavonoids, sterols, glycosides, and other micronutrients (Prajapati *et al*., 2011). Phytochemically, while both species contain valuable bioactive compounds such as flavonoids and phenolics, their profiles may differ, potentially leading to variations in their medicinal properties.

Colocasia esculenta and *Xanthosoma sagittifolium* are not only dietary staples in many tropical regions but also possess a wealth of bioactive compounds that could offer therapeutic benefits. The phytochemical profiles of C. esculenta and X. *sagittifolium* have not been extensively compared, leaving a gap in our understanding of their relative health-promoting properties. This knowledge is critical given the growing interest in plant-based compounds for their potential health benefits. Therefore, this study was carried out to compare and analyze the phytochemical profiles of corms of *Colocasia esculenta* and *Xanthosoma sagittifolium*.

2. Materials and Methods

2.1 Study Area

This study was carried out at the Department of Plant Science and Biotechnology, University of Port Harcourt, Choba, Rivers State. It is located on Latitude 4º54’42” N and Longitude 6º54’00”

2.2 Source of Sample

Colocasia Esculenta and *Xanthosoma Sagittifolium* were sourced from Aspatech Integrated Farms at Trans-Kalabari road, Rumuolumeni, Port Harcourt, Rivers State.

2.3 Sample Collection

The corms were carefully harvested, with attention to avoid contamination and transported immediately to Department of Plant science and Biotechnology, Rivers State University, located on Latitude 6º58’39.12”E and Longitude 4º48’18.50 where they were identified by the plant taxonomist Dr. (Mrs) M. G. Ajuru.

2.4 Sample Description

The *Colocasia esculenta* samples were characterized by smooth, brown skin with a starchy, white or purple-tinged flesh, while the *Xanthosoma Sagittifolium* samples exhibited generally larger, rougher, and more fibrous flesh.

2.5 Sample Preparation

Corms of *Colocasia esculenta* and *Xanthosoma Sagittifolium* were washed thoroughly to remove soil and debris. The cleaned samples were then sliced into smaller pieces and air-dried to remove moisture. Following drying, the

samples were ground into fine powder using a mechanical grinder, ensuring uniform particle size for consistent analysis.

2.6 Methodology

The methods of AOAC, (2005) were used for the determination of oxalate, saponin, tannin, alkaloid and flavonoid compositions. All analysis were done in triplicate.

3. Results

3.1 Saponin Content

Colocasia esculenta had a slightly higher saponin content (0.682%) compared to *Xanthosoma sagittifolium* (0.625%).

3.2 Tannin Content

Tannin content was very low in both species, but *Colocasia esculenta* had a slightly higher tannin percentage (0.0001235%) than *Xanthosoma sagittifolium* (0.0000985%).

3.3 Alkaloid Content

There was a significant difference in alkaloid content between the two species. *Colocasia esculenta* had a much higher alkaloid percentage (1.065%) compared to *Xanthosoma sagittifolium* (0.17%).

3.4 Flavonoid Content

Xanthosoma sagittifolium had a higher flavonoid content (2.76%) compared to *Colocasia esculenta* (1.64%).

3.5 Oxalate Content

Xanthosoma sagittifolium also had a higher oxalate content (0.558%) compared to *Colocasia esculenta* (0.3685%)

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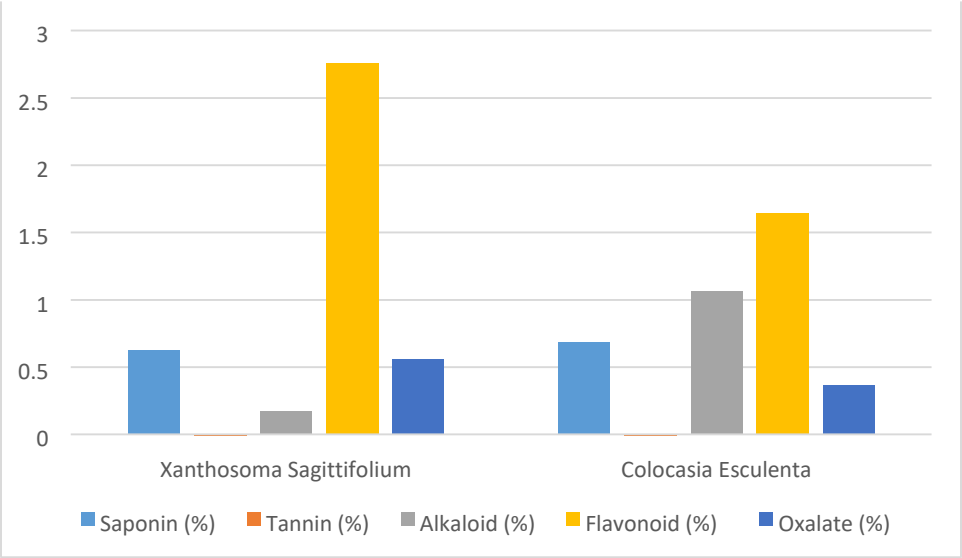

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Fig 1: Comparative Phytochemical Contents of *Xanthosoma Sagittifolium* and *Colocasia Esculenta*

4. Discussion

The results indicate that *Colocasia esculenta* has a slightly higher saponin content compared to *Xanthosoma sagittifolium*. Saponins are a group of naturally occurring plant glycosides known for their ability to form soap-like foams when mixed with water. They have been associated with various health benefits, including cholesterol-lowering properties, immuneboosting effects, and potential anticancer activities (El Aziz *et al*., 2019). The presence of saponin is in agreement with the findings of McEwan *et al*. (2014). The relatively similar saponin levels in both plants suggest that they could both provide comparable health benefits related to saponin consumption.

The tannin content in both *Xanthosoma sagittifolium* and *Colocasia esculenta* was very low, with *Colocasia esculenta* having a slightly higher level compared to *Xanthosoma sagittifolium*. Tannins are polyphenolic compounds known for their astringent properties, which can contribute to the plant's defense against herbivores and pathogens (Fraga-Corral *et al*., 2020). In terms of human health, tannins are recognized for their antioxidant properties and their potential to inhibit the growth of bacteria, viruses, and fungi (Tong *et al*., 2022). The low tannin levels in both plants is similar to findings of Abdurashid and Agwunobi (2012) and suggest that their contributions to antioxidant activity may be limited.

A significant difference is observed in the alkaloid content, with *Colocasia esculenta* containing much higher levels compared to *Xanthosoma sagittifolium*. Alkaloids are a diverse group of nitrogen-containing compounds that are often pharmacologically active, making them important in traditional medicine (Gupta et al., 2020). They can have a variety of effects, including analgesic, anti-inflammatory, and antimicrobial activities (Jafaar *et al*., 2021). The presence of alkaloids is also in agreement with the findings of McEwan *et al*. (2014), but the higher alkaloid content in *Colocasia esculenta* suggests that it may have more potent medicinal properties, potentially offering greater therapeutic benefits. This could make *Colocasia esculenta* more valuable in contexts where alkaloid-related health effects are desired.

Xanthosoma sagittifolium exhibited a higher flavonoid content compared to *Colocasia esculenta*. Flavonoids are well-known for their antioxidant properties, which can help in preventing cellular damage caused by free radicals. They also have anti-inflammatory, antiviral, and anticancer potential (Zhang *et al*., 2018). Udo et al. (2020) also reported significant flavonoid content in wild cocoyam. The significantly higher flavonoid content in *Xanthosoma sagittifolium* suggests that it may offer more substantial antioxidant benefits, making it a potentially more effective dietary source for reducing oxidative stress and related diseases.

Xanthosoma sagittifolium also had a higher oxalate content compared to *Colocasia esculenta*. Eleazu et al. (2018) also reported the presence of oxalates in cocoyam corms. Oxalates are organic compounds found in many plants, and while they can have some beneficial effects, they are also known to bind with calcium to form kidney stones in susceptible individuals (Savage and Klunklin, 2018). The presence of oxalates, which is responsible for the acrid taste or irritation in its raw corm, is the major factor inhibiting the utilization of cocoyam (Oke and Bolarinwa, 2012) and the higher oxalate content in *Xanthosoma sagittifolium* suggests that caution may be needed when consuming this plant.

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5. Conclusion

The comparative analysis of *Xanthosoma sagittifolium* and *Colocasia esculenta* reveals distinct phytochemical profiles that offer unique nutritional and medicinal benefits. *Colocasia esculenta* is richer in saponins, tannins, and alkaloids, indicating its potential for stronger therapeutic effects, particularly in traditional medicine. On the other hand, *Xanthosoma sagittifolium* boasts a higher flavonoid content, which may provide superior antioxidant benefits, making it valuable for reducing oxidative stress and related health issues. However, the higher oxalate content in *Xanthosoma sagittifolium* necessitates caution, especially for individuals at risk of kidney stone formation. Overall, these findings underscore the importance of understanding the phytochemical composition of underutilized plants to optimize their use in food and medicine.

It is therefore recommended that *Xanthosoma sagittifolium* should be promoted as a dietary source of antioxidants, especially for individuals seeking to enhance their intake of natural compounds that combat oxidative stress, but with caution due to its higher oxalate content. Also, *Colocasia esculenta* should be further explored for its higher alkaloid content, which could be harnessed for developing herbal remedies with potential anti-inflammatory and antimicrobial properties. Finally, additional studies should be conducted to explore the bioavailability and safety of the phytochemicals in these plants, particularly the impact of their oxalate content on health, to ensure they are safe for widespread consumption.

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