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## Anxiety-Mitigating Potential of the Ethylene Extract of *Tetrapleura tetraptera*

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### Abstract

**Background:** *Tetrapleura tetraptera*, a traditional herbal remedy in Sub-Saharan Africa, is widely recognised for aiding postpartum recovery. This study evaluates its potential anxiolytic effects in female Wistar rats. The objective of this study is to assess the anxiety-mitigating effects of the ethanolic extract of *Tetrapleura tetraptera* (TTE) in female Wistar rats.

**Method:** Twelve rats were divided into two groups: a control group receiving distilled water and a test group receiving 100 mg/kg of TTE orally for 14 days. Anxiety-like behaviours were assessed using the Light-Dark Transition Box test. Parameters included entries into compartments, rearing frequency, and grooming behaviours. Data were analysed using independent t-tests, with statistical significance at  $p < 0.05$ .

**Results:** TTE-treated rats exhibited fewer entries into the dark compartment ( $3.17 \pm 0.54$ ) compared to controls ( $4.17 \pm 0.54$ ), though not significant ( $p = 0.222$ ). However, rearing frequency, an indicator of reduced anxiety, was significantly higher in the TTE group ( $23.17 \pm 1.90$ ) than in controls ( $10.67 \pm 0.33$ ,  $p < 0.001$ ).

**Conclusion:** TTE demonstrated anxiolytic effects, supporting its traditional use in postpartum care. Further studies are recommended to elucidate its pharmacological mechanisms.

**Keywords:** *Tetrapleura tetraptera*, Anxiety, Anxiolytic, Light-Dark Transition Box, Wistar Rats.



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## Introduction

The dried fruit pods are traditionally used to aid postpartum recovery, enhance uterine involution, stimulate lactation, and improve maternal health.<sup>1</sup>

The postpartum period is critical and characterised by significant physical and psychological changes. Approximately 20% of mothers globally experience postpartum anxiety, which manifests as heightened fear, worry, and restlessness. This condition can impair maternal well-being and bonding with the newborn.<sup>2</sup> Effective management is essential for maternal stability. Traditional practices in Sub-Saharan Africa have incorporated *T. tetraptera* as an agent for alleviating anxiety and promoting maternal recovery. These

applications are supported by preliminary evidence suggesting that *T. tetraptera* contains bioactive compounds with neuroprotective, anti-inflammatory, and anxiolytic properties. Aridanin, an isolate from *T. tetraptera*, has demonstrated anxiolytic effects in animal models.<sup>3</sup> However, rigorous research validating these claims and elucidating mechanisms is limited.

This study bridges the gap between traditional knowledge and modern science by evaluating the anxiolytic effects of *T. tetraptera* ethanolic extract (TTE) in female Wistar rats. Behavioural changes indicative of reduced anxiety were assessed, contributing to the growing body of research on plant-based anxiolytics, which may offer safer and more accessible alternatives to conventional pharmaceuticals.<sup>4,5</sup>



**Figure 1:** Dried Fruit Pods of *T. tetraptera*

This study aimed to investigate the anxiolytic effects of *Tetrapleura tetraptera* ethanolic extracts (TTE) on female Wistar rats.

## Method

This experimental study used twelve healthy female Wistar rats, aged seven weeks and weighing between 87 and 103 g. The rats were housed in standard laboratory cages under a 12-hour light/dark cycle with ad libitum access to standard rat chow and clean water. They were acclimatised for seven days before the study.

The Plant Science Department at Rivers State University procured and authenticated the dried pods of *T. tetraptera*. The ethanolic extract was prepared via cold maceration, where 500 g of powdered pods were soaked in 70% ethanol for 72 hours. The solution was filtered twice, first with cheesecloth and then with filter paper, and concentrated in a thermo-regulated water bath at 35–40 °C to yield a crude extract of 100 mg/ml.

The rats were randomly assigned to two groups (n=6 each):

1. **Control Group:** Received distilled water and standard rat chow.

2. **Test Group:** Administered 100 mg/kg of TTE orally for 14 days.

On the 14th day, anxiety-like behaviours were assessed using the Light-Dark Transition Box test. The apparatus, consisting of a brightly lit compartment connected to a dark one, measures anxiety-related behaviours such as:

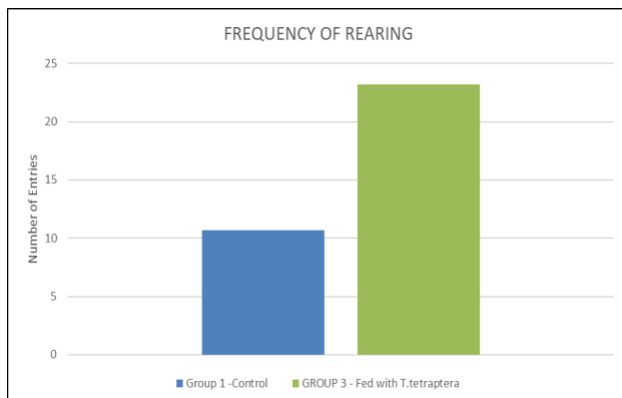
- Frequency of entries into light and dark compartments.
- Duration of time spent in each compartment.
- Exploratory behaviours, including rearing.
- Grooming, stretching, defecation, and urination frequencies.

The apparatus was cleaned with 70% ethanol between trials. Data were expressed as Mean  $\pm$  Standard Error of the Mean (SEM) and analysed using independent t-tests with significance set at  $p < 0.05$ .

## Results

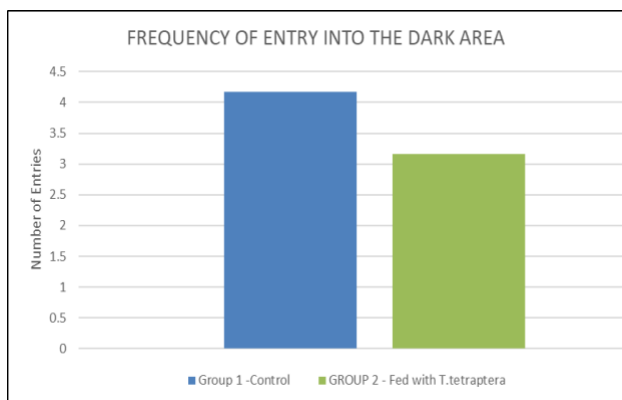
The Frequency of Rearing refers to the number of times the experimental rats stood on their hind limbs. This also coincided with the number of times the animals stretched. The average count of this parameter was

10.67±0.34 in the Control Group and 23.17±1.91 in Group 2; this result was significant statistically. Increased rearing activity is associated with reduced anxiety.



**Figure 2:** Mean Count of Rearing and Stretching in the Light-Dark Transition Box Test, Values represent mean ± SEM, n=6; a Significant at  $p < 0.05$

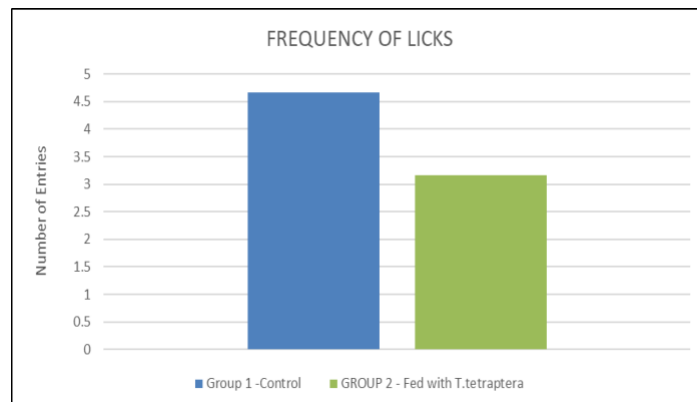
The average frequency of entry into the dark section of the box was higher in the control ( $4.17 \pm 0.55$ ) when compared to the test groups ( $3.17 \pm 0.55$ ) however this was not significant. Rats placed in the light chamber would swiftly move to the dark chamber and hesitate to enter the light chamber. Thus, decreased activity in the dark chamber signifies less fear, whereas heightened activity in the dark chamber indicates increased fear.



**Figure 3:** Mean Entries into the Dark Area in the Light-Dark Transition Box Test, Values represent mean ± SEM, n=6

The average number of licks was higher in the control group ( $4.67 \pm 0.5$ ) when compared to group 2 ( $3.17 \pm 0.71$ ) however, this was also not significant. Grooming, as depicted by the frequency of licks, is a displaced behaviour indicating anxiety. Although the control group showed a higher frequency of licks than

the test group, this difference was not statistically significant. This study demonstrated that *Tetrapleura tetraptera* reduces fear and anxiety in rats and corroborates the anxiolytic findings of Aridanin – an isolate from *Tetrapleura tetraptera*.<sup>6</sup>



**Figure 4:** Mean Frequency of licks in the Light-Dark Transition Box Test, Values represent mean ± SEM, n=6

## Discussion

The findings of this study highlight the potential of *Tetrapleura tetraptera* (TTE) as a natural anxiolytic agent, reinforcing its traditional use in postpartum care. The significant increase in rearing frequency observed in the TTE-treated rats indicates reduced anxiety and heightened exploratory behaviour, which are reliable markers of anxiolytic activity in rodent models. Although the reduction in entries into the dark compartment was not statistically significant, the trend suggests a decrease in anxiety-like behaviours, consistent with the broader effects of plant-based anxiolytics. These findings align with previous research demonstrating the efficacy of herbal remedies in modulating anxiety-related responses through mechanisms involving neurotransmitter systems.<sup>1,4</sup>

The anxiolytic effects of TTE may be attributed to its bioactive compounds, such as aridanin, a known isolate of *Tetrapleura tetraptera*. Aridanin has been shown to modulate gamma-aminobutyric acid (GABA) pathways, which are central to the regulation of anxiety and fear responses.<sup>3</sup> The observed behavioural changes may also involve serotonin (5-HT) modulation, given the role of this neurotransmitter in emotional regulation. While these pathways were not directly examined in this study, they provide plausible mechanisms that warrant further investigation.

Although not statistically significant, the reduction in grooming frequency suggests diminished stress and

anxiety in TTE-treated rats. Grooming is often considered a displacement behavior that reflects heightened anxiety levels in rodents.<sup>4</sup> This observation aligns with the overall pattern of reduced anxiety-like behaviours in the test group, further supporting the anxiolytic properties of TTE.

The findings also offer important implications for maternal health. Postpartum anxiety is a common yet under-addressed condition, particularly in resource-limited settings where access to conventional anxiolytics may be restricted due to cost, availability, or cultural acceptance. The efficacy of TTE as a natural anxiolytic provides a promising alternative to pharmacological treatments, which are often associated with side effects, dependency, and contraindications in breastfeeding mothers.<sup>6</sup> Its ethnomedicinal use, combined with the scientific validation provided by this study, supports the integration of *T. tetraptera* into maternal care practices.

However, further investigations are necessary to explore its molecular pathways, dose-response relationships, and applications in broader populations.

#### **Implications of the findings of this study**

##### *Policy:*

- 1) Promoting Herbal Therapies: The results suggest that policies encouraging the study and integration of traditional remedies like *Tetrapleura tetraptera* into primary healthcare systems can improve access to affordable anxiety treatments
- 2) Maternal Health Focus: Governments could prioritize research funding for plant-based remedies, particularly for postpartum anxiety, common in low-resource settings.

##### *Practice:*

- 1) Awareness and Training: Training programs for midwives and healthcare providers should include education on traditional remedies with proven benefits

##### *Future Research:*

- Dose-Response Studies: Explore the optimal dosages and duration of *T. tetraptera* extract use.
- Clinical Trials: Conduct controlled trials to validate findings in human populations.

#### **Strengths and Limitations of the Study**

##### **Small Sample Size:**

Using only twelve animals limits the statistical power of the findings and may reduce their generalizability. A larger sample size would provide more robust conclusions and increase the reliability of the observed effects.

##### **Single-Dose Protocol:**

The study used only one dose (100 mg/kg) of *Tetrapleura tetraptera*, restricting insights into the dose-response relationship and the therapeutic range of the extract. Future studies should incorporate multiple doses to understand its pharmacodynamics better.

##### **Duration of Study:**

The administration of *Tetrapleura tetraptera* was limited to 14 days. While this period aligns with traditional use, more extended studies could help assess the extract's long-term safety and efficacy.

#### **Conclusion**

This study demonstrates the anxiolytic potential of the ethanolic extract of *Tetrapleura tetraptera* (TTE) in female Wistar rats, as evidenced by increased rearing activity and reduced entries into the dark compartment in the Light-Dark Transition Box test. These findings provide empirical support for its traditional use in alleviating postpartum anxiety. With a favourable safety profile at the administered dose, TTE shows promise as a natural alternative for managing anxiety, particularly in resource-limited settings. However, further research is needed to explore its molecular mechanisms, long-term safety, and broader applications across different populations. *T. tetraptera* could bridge the gap between traditional remedies and modern pharmacology, offering an accessible option for anxiety management.

#### **Declarations**

**Ethical Consideration:** Ethical approval for the unpublished master's dissertation from which this study was extracted, was obtained from the Faculty of Basic Medical Sciences, Rivers State University Research Ethics Committee with ref: RSU/FBMS/REC/23/007 dated 1<sup>st</sup> June 2022.

**Authors' Contribution:** Wami-Amadi CF and Owborji BI developed the research hypothesis and study design.

Development and Conduct: Nonju II contributed to methodology and data collection.

Reporting: Victor PG assisted in the review and drafting of the manuscript.

All authors approved the final version for publication.

**Conflict of interest:** Authors declare no conflict of interest

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## References

1. Ojewole JA, Adewunmi CO. Anti-inflammatory and hypoglycaemic effects of *Tetrapleura tetraptera* (Taub) [Fabaceae] fruit aqueous extract in rats. *J Ethnopharmacol.* 2004;95(2–3):207-12. doi:10.1016/j.jep.2004.06.026.
2. Radoš SN, Matijaš M, Anđelinović M, Čartolovni A, Ayers S. The role of posttraumatic stress and depression symptoms in mother-infant bonding. *J Affect Disord.* 2020; 268:134-40. doi:10.1016/j.jad.2020.03.006.
3. Aderibigbe AO, Iwalewa EO, Adesina SK, Adebanjo AO, Ukponmwan OE. Anticonvulsant, analgesic and hypothermic effects of aridanin isolated from *T. tetraptera* fruit in mice. *J Biol Sci.* 2007;7(8):1520-4.
4. Awad R, Levac D, Cybulska P, Merali Z, Trudeau VL, Arnason JT. Effects of traditionally used anxiolytic botanicals on GABA receptor activity. *J Ethnopharmacol.* 2007;113(3):552-6. doi:10.1016/j.jep.2007.07.015.
5. Abdullahi RA, Mainul H. Preparation of medicinal plants: Basic extraction and fractionation procedures for experimental purposes. *J Pharm Bioallied Sci.* 2020;12(1):1-10.
6. Griebel G, Holmes A. Fifty years of hurdles and hope in anxiolytic drug discovery. *Nat Rev Drug Discov.* 2013;12(9):667-87. doi:10.1038/nrd4075.