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Impact of Administering Leaf and Bark Extracts of some Botanicals on Body Weight, PVC and RBC in *Oryclagus cuniculus*

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Abstract

Humanity faces with many infections, including viral, bacterial, and fungal. Medical experts propose that individuals with strong immunity are more likely to survive infections compared to those with weaker immunity. Therefore, people should enhance their immunity through increased intake of fruits and vegetable sorme dictations with immune boosting properties to better withstand unforeseen infections. Cocktail of some herbal extracts which contained leaves of Sorghum biclor, Persea americana, Treculia africana and barks of Deteruim microcarpum were examined for boosting of pack cell volume (PCV) and red blood cell (RBC) of laboratory animals. It was done by feeding the cold extracts of the cocktail to groups of rabbits for 28 days (4weeks) at varied doses. PCV and RBC tests were subsequently carried out on the rabbits to determine the effects of the cocktail on the blood of the rabbits as well as body weights. The results revealed a steady increase in weights for the control rabbits which ranged between 23.69± 2.97 to 26.91± 4.32, PCV ranged between 32.7 to 36.9 and RBC ranged between 4.4x10^6 to 5.4 x10^6 while the treated rabbits experienced slight decreases in their body weights towards the end of the experiment, groups 1, 2 and 3 ranged between 21.73 ± 0.83 to 25.97 ± 3.73, 19.50 ± 1.05 to 24.69 ± 4.82 and 22.70 ± 3.87 to 26.91 ± 4.85 respectively. In addition, the mean PCV of the groups 1, 2 and 3 ranged between 29.7 to 39.1, 34.0 to 36.1 and 30.0 to 36.4 respectively. RBC count recorded for the treated groups, 1, 2 and 3 ranged between 29.7x10^6/mm^3 to 39.1 x10^6 /mm^3 4.4 x10^6/mm^3 to 4.5 x10^6/mm^3 and 4.2 x10^6 /mm^3 to 4.1x10^6/mm^3 respectively. The results indicated that the cocktail has the capacity to boost the PCV and RBC but should not be used for so long.

Keywords: African Breadfruit, Avocado, Guinea Corn, Pack cell volume, Red blood cell, Tallow

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INTRODUCTION

Herbs are plants valued for their aromatic, flavor, or medicinal qualities. Common culinary herbs include basil, rosemary and thyme. Medicinal herbs like chamomile and Echinacea are known for their health benefits (Alan, 2019 ; Moawiya *et al*., 2020). Various local herbs have various effects on the bodies of animals. Herbs work by supplying body with many different nutrients that tone and revitalize. As a result of their diverse phytochemical formation, they were effective in small doses and produce few side effects. Some local herbs work as general tonic that cleanse, nourish and rebuild on a cellular level (Moawiya, *et al*., 2020). Others have an affinity for a specify system or organ and may be used to treat related imbalances or symptoms. The work agently and naturally to support the body's own healing processes (Alan, 2019).

Today, herbal plants (also known as medicinal plants, herbs and herbal medicines, pharmacologically active plants or phytomedicinals) are dominant form of medicine in most countries (Barrent and Kieffer, 2001;WHO, 2023).The effectiveness of these herbal preparations and infusions to treat illnesses has been widely recognized by many people all over the world. Despite this fact, scientific studies to validate the medicinal properties of the plants are scarce (Garcia- Alvarado *et al.,* 2001). For instance, in Mexico, more than 1000 plant species are used for herbal treatments, yet, less than 20% of these species have been studied in order to scientifically validate their uses. One of the main reasons for this lack of study is that researchers preferentially select the most widely distributed, abundant and commonly used plants for their research purposes (Browner, 1985; Ogunsola and Egbewole, 2018).

Furthermore, research projects directed towards validating the empirical uses of herbal plants usually consist of *invivo* or *invitro* tests of the activities of plant extracts on pathogenic micro organisms, affected tissues or organs, as well as phytochemical studied to identify the chemical structure of the active metabolites present in the plant extract (Garcia- Alvarado *et al*., 2001). For a large part of the population in the country, the effectiveness of herbal plants in the treatment of diseases, combined with poverty, the lack of formal education and access to health services has resulted in widespread use of herbal medicine. The need for specific validation of the effectiveness of poorly-studied medicinal plants which will determine the reliability of the use of these herbs and at the same time would identify those that are ineffective is important (Garcia- Alvarado *et al*., 2001: Mujinja and Saronga, 2022). Herbal plants affecting the immune system have been extensively researched. According to Knight (2003), herbs that affect immune system act on the immune system as: surface activators, deep activators or supporting herbs (balancing tonics and adaptogens). Surface activators are antimicrobial substances that are well known worldwide, such as Echinacea (*Echinaces angustifolia*) and garlic (*Allium sativum*). They are used for conditions such as chronic respiratory problem such as asthma and pneumonia, skin infection, cold and flu.

Deep activators affect the deeper tissues in the body and are used for conditions which have developed over long period of time such as Candida (a kind of yeast that can cause infections), Chronic fatigue and Cancer. These herbs originate from traditional Chinese medicine and include Austragalus (*Astragelis membranaceus*), Reishi, Shiitake and maitake Mushrooms (*Agricus spp*.) supporting herbs, tend to consist of cleanser, tonics and adaptogens to keep the blood, adrenal and hormonal system clean and running unhindered (Olanrewaju, *et al.,* 2022). *Sorghum bicolor* is a cereal grain plant that belongs to the grass family Poaceae. It is commonly known as sorghum and is cultivated for its grain, which is used for food, fodder, and biofuel production. Sorghum is a drought-tolerant crop and is an important staple food in many regions, especially in Africa and Asia. Additionally, it has various industrial applications, such as in the production of sorghum syrup and as a feedstock for bioenergy. *Sorghum bicolor*,

commonly known as sorghum, is not typically referred to as an herb. Instead, it is classified as a cereal grain belonging to the grass family Poaceae (Fidelis, *et al.,* 2024). While the term "herb" is often associated with plants used for culinary, medicinal, or aromatic purposes, sorghum is primarily cultivated for its grains. However, it's worth noting that certain parts of the sorghum plant may have traditional or medicinal uses in some cultures. For instance, some communities might use extracts from sorghum leaves or other plant parts for various purposes. Still, these uses are not as widespread or well-documented as those of plants explicitly considered herbs (Yuanpeng, *et al*., 2023).

Persea americana, commonly known as the avocado, is a fruit tree native to south-central Mexico. Avocados are highly valued for their creamy texture and nutty flavor. They are not only delicious but also nutritious, being rich in healthy monounsaturated fats, vitamins and minerals. Avocados have gained popularity worldwide and are used in various culinary dishes, such as salads, guacamole, and sandwiches. Beyond their culinary uses, avocados contain beneficial nutrients like potassium, vitamin K, vitamin E and foliate (Mohamed, *et. al*., 2023). Additionally, some studies suggested that avocados may have various health benefits, including promoting heart health and aiding in weight management. However, it's essential to consume them as part of a balanced diet. *Persea americana*, or avocado, is not traditionally considered a medicinal plant in the same way as some other herbs or plants used specifically for therapeutic purposes. However, avocados do offer various health benefits due to their nutritional content. Avocados are rich in monounsaturated fats, which are considered heart-healthy fats. They also contain various vitamins, such as vitamin K, vitamin E, vitamin C and B-vitamins, along with minerals like potassium. Some studies suggest that avocados may have potential health benefits, including supporting cardiovascular health, reducing inflammation, and aiding in weight management (Girón-Vázqueza *et al*., 2019).

Treculia africana is a tropical tree native to West and Central Africa. It is known for its large, edible seeds, commonly called "African breadfruit." These seeds are rich in nutrients and are used in various culinary preparations. Additionally, the tree has cultural and medicinal significance in certain regions. *Treculia africana* is not typically referred to as an herb; rather, it is a tree species. However, various herbs and plants are used in traditional medicine in different regions, and the knowledge of their properties can vary. If you're interested in medicinal plants or herbs from the same region, you might want to explore traditional uses of plants in West and Central Africa. Keep in mind that traditional uses may not always align with scientifically proven benefits. *Treculia africana* has been used in traditional medicine in some regions of West and Central Africa. Various parts of the plant, including the bark, leaves, and seeds, are reported to have medicinal properties. The seeds, in particular, are believed to have nutritional and therapeutic benefits. Some traditional uses include the treatment of ailments such as respiratory issues, gastrointestinal problems, and skin conditions. However, it's crucial to note that while traditional knowledge is valuable, scientific research on the medicinal properties of *Treculia africana* is limited, and not all traditional uses may be supported by rigorous scientific evidence Philippa, *et al*., (2021).

Detarium microcarpum is a tropical tree found in various parts of West Africa. Commonly known as "sweet detar" or "tallow tree," this tree produces distinctive round fruits with a sweet, fibrous pulp surrounding a hard seed. The seeds are edible and are used in traditional cuisines. In addition to its culinary uses, various parts of the *Detarium microcarpum* tree, including the bark and leaves, have been employed in traditional medicine for treating different ailments. However, it's essential to note that while there may be traditional knowledge of its medicinal properties, scientific research on its therapeutic benefits is limited. *Detarium microcarpum* is indeed used in traditional medicine in some regions of West Africa

(Hinawi, *et al*., 2019). Different parts of the plant, including the bark, leaves, and roots, are employed for various medicinal purposes. Traditional uses include treating conditions such as diarrhea, dysentery, and stomach ailments. Some communities also use parts of the plant for their potential anti-inflammatory and antimicrobial properties (Ablasse, *et al*., 2017; Rimsha, *et al*., 2022).

The majority of research on scientific herbal plants has been conducted in Europe (Fisher and Ward, 1994; Salmeron-Manzono *et al*., 2020), particularly in Germany, and in Asia, particularly China (Ladokun, *et al*., 2015). Research into low-cost technologies is critical because large-scale implementations require substantial resources (Salmeron-Manzono and Manzono-Agugliaro, 2020). The analysis enables us to monitor the development and progress of research in this field. Therefore, given the rapid increase in the use of herbal medicine, particularly immune boosters, for treating AIDS, there is a pressing need for rigorous scientific research to substantiate their clinical effectiveness (Salmeron-Manzono *et al*., 2020). Consequently, the aim of this study is to evaluate the potential effects on overall health and hematological parameters in experimental animals.

METHODOLOGY

Samples Collection

The test animals (Twelve rabbits) were bought from Mercyland Osogbo and the used plants were collected from a farm in Masifa –Ile, Ejigbo Local Government area of Osun State.

Herbal Plants Used

Leaf and bark of *Parsia Americana* (Pear or Avocado), leaf and bark of *Treculia Africana* (African Breadfruit) leaf and bark of *Detarium microcarpum* (Tallow) and leaves of *Soghurm bicolor* (Guinea Corn).

These plants were submitted to the Taxonomy Unit of the Department of Botany at the University of Lagos for proper identification.

Preparation of the Coctail

The fresh leaves and bark of *Parsia Americana, Treculia africana* and *Detarium microcarpum* but leaves of *Soghurm bicolor* were sorted out to remove extraneous materials and rinsed with water to remove debris and dust particles. They were air dried and pulverized. Portion (50g) of each powdered leaves and bark were weighed into a beaker and 500ml of warm distilled water was added and stirred for 20 minutes. This was left to stand for 24 hours. It was then filtered using whatman filter paper to obtain aqueous extract (cocktail) which was then stored in the refrigerator. Fresh extracts were prepared every 72 hours Chinedu, *et al*., (2020).

Biological and Physiological Data of the Rabbits.

The body weights of the rabbits were measured three times throughout the experiment to monitor their weight gain. It was done at the interval of 7 days for three consecutive times.: Day 0, Day 7 and Day 14. Both control and experimental rabbits were normally fed, following the standard procedure of Chinedu, *et al*., (2020).

Administration of the Cocktail to the Rabbits.

The cocktail was administered to the experimental rabbits once a day by oral (through mouth) based on their body weights:

group 1 with 0.5mg/kg per day,
group 2 with 1.0mg/kg per day and
group 3 with 1.5mg/kg per day.

Control animals were three (3) in number just like that of others in the experimental and were fed normally, i.e without cocktail.

Collection of Blood Samples.
Blood sample of each rabbit was collected through a vein on any of the two ears by capillary action using a needle syringe into EDTA bottled. After which PCV and RBC tests were carried out in the laboratory in both experimental and the control rabbits. This was done at the intervals:
Test 1; Day 0, for baseline analysis of the blood.
Test 2; Day 14, for the first major analysis of the effects of the extracts in the blood.
Test 3; Day 28, for final analysis of the effects of the extracts in the blood.

Proximate Analysis.
For each of the test carried out, readings were recorded for individual rabbits in each group. At the end of 28days period of experiment, a total of 3 major readings have been taken for each rabbit in each group. The weight changes of the rabbits were also recorded at the same intervals as those of the test readings. The mean of the three (3) readings for the three (3) rabbits in each group of the experimental groups and control were calculated and recorded plus/minus (±) the standard deviation. The variations in the average total weight and hematological parameter of the rabbits compared over the duration of the experiment (Tables 1, 2 and 3).

RESULTS
Table 1 showed that average weight increase for control rabbits was steady, compared to the treated rabbits, which showed an initial average weight increase and then a decrease towards the end of the experiment.

Table 2 showed Pack Cell Volume (PCV) values for the control which exhibited a steady increase over the period of the experiment, while in the treated group, there was an initial general increase in the PCV values towards the middle of the experiment, followed by a gradual decline towards the end of the experiment.
Table 3 showed Red Blood Cells (RBC) count values for the control group and treated groups are similar in their variations to that of the packed cell volume, since both have to do with erythrocyte number. The control group showed a steady increase in their red blood cells count throughout the period of the experiment, while the treated groups showed a slight increase in their red blood cell counts towards the middle of the experiment, then, followed by a gradual decrease towards the end of the experiment.

Table 1: Effect of Treatment on Average Total Weight in Rabbits Over Two Weeks (g)

Treatment(Day)	Control	Group 1	Group 2	Group 3
0	23.69±2.97	21.73±0.83	19.50±1.05	22.70±3.87
7	24.29±4.98	22.42±1.69	20.49±1.37	24.63±1.71
14	25.30±2.86	25.42±2.59	21.59±2.81	25.75±2.70
21	26. 39 ±3.26	27.42±0.69	24.49±3.37	26.73±1.60
28	26.91±4.32	25.97±3.73	24.69±4.82	26.91±4.85

Table 2: Effects of the Herbal Cocktail on the Packed Cell Volume (PCV in %) and Red Blood Cells (RBC in x 10^6mm^3) Counts of the Rabbits

Treatment (Day)	Control		Group 1		Group 2		Group 3	
0	32.7	4.4 x10^6	29.7	4.1 x10^6	34.0	4.4 x10^6	30.0	4.2 x10^6
7	35.7	4.5 x10^6	39.0	4.2 x10^6	34.6	4.5 x10^6	32.7	4.0 x10^6
14	36.3	4.7 x10^6	39.2	4.4 x10^6	35.1	4.7 x10^6	34.3	4.2 x10^6

21	36.7	5.1 x10^6	38.9	4.5 x10^6	36.0	4.9 x10^6	36.3	4.2 x10^6
28	36.9	5.4 x10^6	39.1	4. 3 x10^6	36.1	4.5 x10^6	36.4	4.1 x10^6

DISCUSSION

The results obtained in the treated rabbits showed that the cocktail of plant extracts had inhibitory effect on the production of various somatic cells especially fat cells in the body of the rabbits when it is used for a long period of time (Table 1). This observation is in line with the results obtained by Wamidh, *et al.,* 2020, when his team worked on the impact of herbal infusion consumption on oxidative stress and cancer: the good, the bad, the misunderstood. The decrease recorded for PCV values in table 2 of the treated groups towards the end of the experiment showed an indirect correlation between the packed the packed cell volume values and the time of administration of the plant extracts to the treated groups. This implied that the decrease in the PCV values in the treated groups, moderate doses of the herbal cocktail should be administered to them, for only a short period of time to prevent possible side effects of the herbal cocktail on the red blood cells. The results obtained aligns with Chinedu *et al.,* (2020) when his team worked on haemotological and hepatological effects of pito, burukutu-guinea corn and burukutu-millet in albino rats.

Changes in red blood cell counts observed in the groups in Table 2, with an initial increase at the early stage of the experiment followed by a decrease towards the end, can generally be attributed to the short lifespan of red blood cells. This result obtained aligns with Chinedu, *et al*., (2020).

CONCLUSION

In conclusion, the administration of aqueous extracts from the leaves and barks of various botanicals have demonstrated significant effects on the body weight, packed cell volume (PCV), and red blood cell (RBC) counts of *Oryctolagus cuniculus*, commonly known as rabbits. Through this study, we have observed both positive and negative impacts on these physiological parameters, indicating the complex interactions between botanical compounds and the biological systems of rabbits.

The findings suggested that certain botanical extracts may have potential applications in managing body weight and hematological parameters in rabbits. However, it is crucial to note that the effects vary depending on the specific botanical used, its concentration and the duration of administration.

Overall, this study has contributed to our understanding of the potential benefits and risks associated with the use of botanicals in animal health management. By investigating the effects on body weight, PCV, and RBC count, we gain valuable insights that could inform future therapeutic interventions and contribute to the development of more effective and sustainable approaches to promoting animal welfare and health.

RECOMMENDATION

This cocktail is effective in boosting blood, managing body weight, and improving hematological parameters in rabbits. Therefore, further research is needed to better understand the efficacy of these herbs, elucidate the underlying mechanisms of action, and assess the long-term effects and safety considerations associated with using these botanical extracts in humans.

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