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RESEARCH ARTICLE

A STUDY OF THE EFFECT OF THE PHYTOCHEMICAL CONTENT OF *P. AMERICANA*LEAF ON HEMATOLOGICAL SYSTEM OF ALBINO RATS

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Abstract

Given the medicinal importance of the avocado plant in alternative medicine, the present study aimed to study the effect of the phytochemical content of *P. americana* leaf extract on the hematological system of albino rats. Albino rats were obtained and clustered into six groups, with five rats per group simultaneously were assigned experimental and control. The rats in the experimental group were administered with varying doses of the prepared aqueous extract of *P. Americana* within the period of the study. The rats in the control group were administered with other substances such as water and feed for the study period. The hematological system of the experimental animal was assessed after the administration of the extract, and it was observed that the aqueous extract of *P. americana* leaf recorded no significant adverse effect on the hematology system of the experimental study animal.

Introduction: -

Today, many essential drugs are directly or indirectly derived from a plant (Mashi et al., 2019; Bauer and Brönstrup, 2014). Plants are becoming a ubiquitous practice in primary health care needs, and the trend is proliferating. Contemporary science has acknowledged its active action. It has included in modern pharmacotherapy a range of plant origin drugs known by ancient civilizations and used throughout the millennia(Petrovska, 2012). Research has pointed out the importance of the medicinal plant to the world's population (Pešić, 2015). Avocado *or Perse* A*mericana* plants are a typical example of a medicinal plant (Edem, 2010). There has been an increasing interest in the study of various avocado parts due to their health-promoting properties and high nutrient value (SeonJu et al., 2019). The plant is used in traditional medicine for the treatment of various ailments, such as menorrhagia, hypertension, stomach ache, bronchitis, diarrhea, and diabetes (e.g., Yasir, Das, & Kharya, 2010; Adeyemi, Okpo & Ogunti, 2002; Antia, Okokon & Okon, 2005; Ojewole & Amabeoku, 2006; Owolabi, Jaja & Coker, 2005). Avocado (*P americana*) aqueous leaf extract has been reported to decrease blood pressure in patients with increased systolic pressure (John & Amabeoku, 2006). Phytochemicals are aqueous chemicals commonly found in the plant (Lele, Egejum & Anudike, 2010). Owolabi et al. (2005), and Tabeshpour et al. (2017) noted that the bioactive phytochemical contents of *P. americana* include vitamins, carotenoids, phytosterols, phenolics, and minerals.

The avocado plant has many medicinal uses (Brai, Odetola & Agomo, 2007). The phytochemical contents of the plant shown to be helpful in hypertension (Ojewole & Amabeoku, 2006; Olaniyan, 2014; Imafidon & Amaechina, 2010), ulcer effect (Ukwe & Nwafor, 2004), antifungal (Raharjo et al., 2008) treatment. The purpose of this study

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was to further the research of the effect of the Phytochemical content of Persea Americana leaf on the hematological system of Albino Rats

Materials and Method: -

Healthy fresh leaves of *Persea americana* were obtained from the local market. The leaves were processed and ground into powdery form and stored. 250g of samples were weighed and soaked with 700ml of ethyl acetate measured using a 500ml measuring cylinder. It was stirred with a glass rod to mix well before storing at room temperature for 24 hours. Then the mixture was filtered severally using a muslin cloth to remove the insoluble materials. The filtrate was poured into a 250ml beaker and then concentrated by evaporating the solvent (ethyl acetate) using a water- bath at 70^{o}C.

Experimental Animals

Forty-five healthy Wister rats were purchased for the current study and were acclimatized for two (2) weeks before the study's commencement. The healthy rats were grouped into six groups of five rats. Thus, The Wister rats were placed in a conducive condition at a controlled room temperature. They were then acclimatized for two weeks and fed with finisher mash and drinking water before they were separated into six groups of five animals each. The aqueous extract of *P. americana* was administered orally to the rats through an intubation tube for 14 days. Rats in groups 1 and 2 were considered the control group and fed with finisher mash and chemiron. Whereas groups 3, 4, 5, and 6 represented the experimental groups and were fed with the *P. americana* leaves extract. The experimental animals were administered with the extract each day. Group 3, 4, 5 and 6 received 200mg/kg, 400mg/kg, 600mg/kg and 800mg/kg of the sample extract respectively. The extract was administered once daily for 14 days. The daily food intake of each group of rats was monitored. The animals were observed closely during the study period for appearance or behavior changes.

Sample Analysis

At the end of the experimental period, all the rats from each group were weighed using an electronic weighing balance. They were starved for 24 hours before the blood sample was collected from the side of the eye (nodular vin or medial canthus of the eye) using a sodium heparinized capillary tube.

Determination of the Hematological level

The Hematological parameters, including packed cell volume PVC, Erythrocyte Sedimentation Rate (Esr), white blood cell count, red blood cell count, lymphocyte and neutrophil counts measured using standard methods as described by Dacie and Lewis (1995).

Result: -

Effect of *Persea americana* leaf extract on hematological parameters of albino rats

Table 1: - Solvent: Distilled water.

Concentration of the extract	WBTC (mm2)	Lymphocyte (%)	Neutrophil (%)	HB (µl)	RBC (µl)	PVC (%)	Platelet (mm3)	Esr (mm3
200	3500	72	28	$6.7x10^6$	13.6	40	610,000	2
400	900	69	31	$7.0x10^6$	12.0	36	480,000	3
600	7500	73	27	$7.2x10^6$	13.8	43	750,000	2
800	7500	71	29	$7.5x10^6$	13.9	42	650,000	2
Control (water)	3300	70	30	$7.4x10^6$	13.9	43.8	944,000	2
Control (Chemiron)	6000	70	30	$5.90x10^6$	12.60	38	295,000	2

Effect of *Persea americana* leaf extract on hematological parameters of albino rats

Table 2: - Solvent: Distilled water

Concentration of the extract	WBTC (mm2)	Lymphocyte (%)	Neutrophil (%)	HB (µl)	RBC (µl)	PVC (%)	Platelet (mm3)	Esr (mm3)
200	3500	78	22	$5.2x10^6$	10.2	31	335,000	2
400	720	76	24	$6.8x10^6$	13.2	42	670,000	3
600	6900	73	27	$7.0x10^6$	13.9	40	270,000	2
800	7200	70	30	$7.0x10^6$	13.9	43	350,000	2

Control (water)	3300	70	30	$7.4x10^6$	14.	43.8	944,000	2
Control (Chemiron)	6000	70	30	$5.90x10^6$	13.9	38	295,000	2

Discussion: -

The current study aimed to investigate the effect of the phytochemical content of *P. americana* leaf on the hematological system of albino rats. Thus, the *Hb, PVC, ESR, WBC, RBC, Lymphocyte and Platelet count*. Following the evaluation using standard method after administering different doses (200, 400, 600, and 800 mg/kg body weight respectively) of the aqueous extract of the study plant. The observation indicated that for WBC (table 1) an elevated value of 3500, 900, 7500mm^3, recorded for all the concentrations compared with the control 3300 and 6000$mm^{3,}$ respectively. The Lymphocyte, Neutrophil, was also recorded in that direction. However, the *Hb, RBC, and PVC* indicated no significant difference relating to their values. *In table 2*, an increased value of 3500, 720, 6900, and 7200mm3 for WBC was observed for all the concentrations compared with the control 3500 and 600mm^3. The *Lymphocyte and Neutrophil* were again in that order, as indicated *in table 1*. The *Hb, RBC, and PVC* appear not to have much difference in their values. An elevated value of 610,000mm^3 was recorded for *Platelet* when compared with the control.

Based on the observed report *in table 1 and table 2*, the study concluded that the *P. americana* leaf extracts have no significant adverse effect on the experimented animal's hematological system. However, an increased level of *WBC* indicates that the phytochemical extract of *P. Americana* could possess chemicals capable of boosting the immune system. Some studies, e.g., Amaza et al. (2016) and Clipsham (2007), have previously indicated the avocado plant's toxicity. The current study is aligned with the position of Brail *et al.* (2020) that supports the literatures indicating the relevance of aqueous extract of *P. americana* in the prevention of certain health issues such as lymphocytosis, leucopenia, and other associated hematological variations. This study is useful as it further supports the effectiveness of the phytochemical extracts of avocado in stimulating the white blood count, which is the major component of the immune system. However, future researchers are urged to explore the effect of the extract on other physiological components.

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References: -

1. Adeyemi, O. O., Okpo, S. O. & Ogunti, O. O. (2002). Analgesic and anti-inflammatory effects of
2. aqueous extract of leaves of Persea americana. Mill Fitoterapia 73, 375-380.
3. Antia, B. S., Okokon, J. E. & Okon, P. A. (2005). Hypoglycemic activity of aqueous leaf extract of
4. Persea americana. Indian Journal Pharmacology. 37:325–326.
5. Bauer, A., Brönstrup, M. (2014). Industrial natural product chemistry for drug discovery and
6. development. Natural Prod. Rep. 31 (1), 35–60. Doi 10.1039/C3NP70058E
7. Brai, B.I, Odetola, A. & Agomo, Philip. (2007). Effects of Persea americana leaf extracts on body weight and liver lipids in rats fed hyperlipidemic diet. African Journal of Biotechnology. 6(8): 1007 - 1011
8. Clipsham, R. (2007) "Avocado Toxicity". http://kgkat.tripod. Com/avocado.html. Retrieved 21-10-2020
9. Edem, O. D. (2010). Anti-hyperlipedic effects of ethanoic extracts of avocado pear seed in alloxan-
10. Induced diabetic rats. Pharmacology. 1:901-908
11. Imafidon, K.E. & Amaechina, F. C. (2010). Effect of aqueous seed extract of Persea americana on
12. blood pressure and lipid profit in hypertensive rats. Adv Bio/Res 4(2): 116-121
13. John, O., & Amabeoku, G. (2006). Anticonvulsant effect of Persea americana Mill (lauraceae)
14. (avocado) leaf aqueous extract in mice. Phytother Res, 696-700.
15. Lele, K. C., Egejum, L. & Anudike, J. (2012). Chemical Composition of Persea americana leaf,
16. fruit and seed. IJRRAS. 11(2): 346-349
17. Mashi, J. A., Atiku, M. K., Shehu, D., Idris, R. I., Sa'id, A. M., Dangambo, M. A., . . . Babandi, A. (2019). Comparative Study of Different Solvents Extract of Persea americana Leaf on Alloxan Induced Hyperglycemic Rats. Asian Journal of Biological Sciences, 67-72.
18. Olaniyan, M. F. (2014). Effect of Liquid Extract of Pear Avocado Leaf (Persea americana) on
19. Plasma Levels of Aminotransferases, Cholesterol and Total Bile Acids in Hypertensive Patients. American Journal of Medicine and Medical Sciences. 4(3): 87-91

20. Ojewole, J. A. & Amabeoku, G. J. (2006). Anticonvulsant effect of Persea americana mill
21. (Lauraceae)(avocado) leaf aqueous extract in mice. Phytother Res. 20:696–700.
22. Ojewole, J.A, Kamadyaapa, D.R, Gondwe, M.M, Moodley K. & Musabayane, C.T. (2007).
23. Cardiovascular effects of Persea americana Mill (Lauraceae) (avocado) aqueous leaf extract in experimental animals. Cardiovasc J Afr. 18(2):69–76.
24. Owolabi, M. A., Jaja, S. I. & Coker, H. A. B. (2005). Vasorelaxant action of aqueous extract of the
25. leaves of Persea americana on isolated thoracic rat aorta. Fitoterapia.76:567–73.
26. Pešić, M. (2015). Development of natural product drugs in a sustainable manner. Brief for United
27. Nations Global Sustainable Development Report 2015. Available at: https://sustainabledevelopment.un.org/content/documents/6544118_Pesic_Development%20of%20natural%20product%20drugs%20in%20a%20%20sustainable%20manner.pdf. (Accessed October 25, 2020).
28. Raharjo S, Witjaksono, Gomez Lim MA, Padilla G, Litz RE. (2008). Recovery of avocado (Persea
29. americana Mill.) plants transformed with the antifungal plant defensin gene. In Vitro Cell Dev Biol. 44:254–262
30. Petrovska, B. B. (2012). Historical review of medicinal plant usage. Pharmacogn Rev, 1-5.
31. SeonJu Park, Youn Hee Nam, Isabel Rodriguez, Jun Hyung Park, Hee Jae Kwak, Youngse Oh, Mira
32. Oh, MinSeon Park, Kye Wan Lee, Jung Suk Lee, Do Hoon Kim, Yu Hwa Park, In Seok Moon, Se-Young Choung, Kwang Won Jeong, Bin Na Hong, Tong Ho Kang, Seung Hyun Kim (2019). Chemical constituents of leaves of Persea americana (avocado) and their protective effects against neomycin-induced hair cell damage, Revista Brasileira de Farmacognosia, Volume 29, Issue 6, Pages 739-743,
33. Tabeshpour, J., Razavi, B. M. & Hosseinzadeh, H. (2017). Effect of avocado Perseaamericanaon
34. the metabolic syndrome: a comprehensive systematic review. Phytother Res.31:819–37.
35. Ukwe, C. V., & Nwafor, S. V. (2004). Anti-ulcer activity of aqueous leaf extract of Persea americana (family-Lauraceae). Nigeria Journal of Pharm Res.
36. Yasir, M., Das, S., &Kharya, M. D. (2010). The phytochemical and pharmacological profile of Persea americana Mill. Pharmacogn Rev, 77-84.