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1.0 THE AMELIORATIVE EFFECTS OF *SOLANUM MELONGENA* (GARDEN EGG), *SOLANUM LYCOPERSICUM* (TOMATOES) AND *DAUCUS CARROT SUB.SATIVUS* EXTRACTS ON LIPID PROFILE AGAINST LEAD INDUCED TOXICITY IN WISTAR RATS.

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1.1 ABSTRACT

Lead effects were assessed by analyzing the impacts of the extract on the lipid profile of rats. Thirty five male wistar rats weighing 85-110g were distributed into five groups consisting of seven rats each. Group I served as control group, group II served as the test group, being given the experimental lead acetate, groups III, IV and V served as treatment groups being given carrot and garden egg, carrot and tomato and carrot, tomato and garden egg respectively.Extraction and all biochemical analysis were carried out using standard laboratory techniques. Lead acetate was induced in the rats orally at a dose of 50mg/kg weight and 200mg/kg of the fruit extracts of 14 days. On the 15th day, the animals were sacrificed and the blood was collected via cardiac puncture and used for analysis using a spectrophotometer. LDL concentration in group 2 is significantly higher ($p<0.05$) in comparison with the level of group 1. There is a non-significant decrease in group 5 ($p<0.05$) compared to the with the LDL concentration level of group 1. TAG concentration in group 2 is significantly lower ($p<0.05$) compared to the concentration level of group 1. There is a significant decrease in group 5 ($p<0.05$) compared to the TAG level of group 1. Total cholesterol concentration in group 2 is non-significantly lower ($p<0.05$) in comparison with the concentration levels in group 2. HDL concentration level in group 2 significantly increased ($p<0.05$) compared to the concentration in group 1. Concentration of HDL in group 5 increased significantly ($p<0.05$) in comparison with group 1. Results suggest lead exposed Wister rats having altered lipid profile are at high risk of cardiovascular diseases. However, the lead toxicity can be treated with the juicy extracts of garden egg, tomato and carrot.

KEYWORDS: Lipid profile, toxicity, cardiovascular diseases,cholesterol and extraction.

1.2 INTRODUCTION

Lead toxicity is an important environmental disease and its effects on the human body are devastating. There is almost no function in the human body which is not affected by lead toxicity. This is primarily because lead bears unique physical and chemical properties that make it suitable for a large number of applications for which humans have exploited its benefits from historical times and thus it has become a common environmental pollutant. (Wani *et al* 2015). Long-term exposure of adults can result in decreased performance in some tests of cognitive performance that measure functions of the nervous system. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered IQ (Rubin & Strayer, 2010). As of 2012, the Centers for Disease Control and Prevention (USA) have set the standard elevated blood lead level for adults to be 10µg/dL and for children 5 µg/dL of the whole blood (CDC, 2012).

All along human history, lead poisoning has been reported to have severe effects. Occasional lead poisoning was found to be caused by lead salts used in pottery glazes leached by acidic fruit juices. Analysis of his hair was found to contain elevated levels of lead (Mai, 2010). Chronic exposure to potentially harmful substances can be treated with fruits and vegetables.

A diet rich in vegetables and fruits can lower blood pressure, reduce the risk of heart disease and stroke, prevent some types of cancer, lower risk of eye and digestive problems, and have a positive effect upon blood sugar, which can help keep appetite in check. Eating non-starchy vegetables and fruits like apples, pears, and green leafy vegetables may even promote weight loss. (Bertoia *et al* 2015). At least nine different families of fruits and vegetables exist, each with potentially hundreds of different plant compounds that are beneficial to health. Eat a variety of types and colors of produce in order to give your body the mix of nutrients it needs. This not only ensures a greater diversity of beneficial plant chemicals but also creates eye-appealing meals.

Fruit extracts can be made or produced from fruits and vegetables and also serve as a slightly better and healthier alternative to the regular fruit juices. Fruit extracts enable the body to absorb important benefits, getting nutritive ingredients found in fruit and vegetables (Martina Sciotto, 2017).

The aim of this research is to study the effect of aqueous extract of garden egg (*Solanum melongena)*, tomatoes (*Solanum lycopersicum)* and carrots (*Daucus carrots subsp.sativus)* extracts on the lipid profile.

2.0 MATERIALS AND METHODS

2.1 Identification And Preparation of Fruits Juice

Garden eggs (*Solanum melongena*), Carrots (*Dauta carota subsp Sativus*) and Tomatoes (*Solanum lycopersicum*) were obtained from Bwari market, Federal Capital Territory, Nigeria. The fruits were validated by a botanist from the department of Microbiology, Veritas University Abuja. Using deionized water, the fruits were thoroughly washed and processed using a juice extractor to obtain their individual extracts. The extracts were placed in a storage vessel and preserved in the refrigerator. The extract was refrigerated at 2 – 5 0C until when used (Asanga et al., 2015).

2.1.1 Animal groupings and treatment schedule.

S/N	Groups	Number of rats	Treatment/Vehicle
1.	Control Group (CG)	7	Feed and distilled water
2.	Test Group (TG)	7	50mg/kg Lead acetate by oral gavage
3.	Carrot and Garden egg treated group	7	50mg/kg Lead acetate and 200mg/kg of extract by body weight.
4.	Carrot and Tomato treated group	7	50mg/kg Lead acetate and 200mg/kg of extract by body weight.
5.	Carrot, Tomato and Garden egg treated group	7	50mg/kg Lead acetate and 200mg/kg of extract by body weight.

2.1.2 Induction of Exprimental Lead Acetate

They were allowed to acclimatize for a week to the climate of the animal house, in the Veritas University, before the beginning of the experiment. During this period, they were fed with rat feed and distilled water *ad libitum* and kept at a standard laboratory condition of 12 hour light and 12 hour dark time alternations at a temperature range of 22-28°c and 40-50% relative humidity.

Good hygiene was maintained by proper cleaning, changing of beddings and removal of faeces and spilled feed from cages daily. The rats were induced lead acetate solution, $Pb(CH_3COO)_2.3H_2O$ which was prepared by dissolving 5g of salt in a 500ml Erlenmeyer flasks, adding 2ml of water, and shaking vigorously.

2.1.3 Collection and Treatment of Samples

All the animals were anaesthetized with chloroform vapor, forty-eight (48) hours after the last day of extract administration and dissected for blood collection. Blood was collected from the heart by cardiac puncture using a 2ml syringe and needle into a set of labelled plain bottles to obtain the serum. Each sample of blood was centrifuged at 3,000rpm for 15 minutes, the serum was collected and distributed into labelled plain bottles. The serum was refrigerated and was used to carry out biochemical analysis.

The biochemical tests carried out was Lipid profile: which includes; cholesterol, tryglycerides, HDL-c, LDL-c and VLDL using Randox test kits.

2.1.4 Statistical Analysis

The results obtained from this study were analyzed by one-way analysis of variance (ANOVA), followed by Student’s T-test to evaluate the significance of the difference between the mean value of the measured parameters in the respective control and test groups using SPSS windows. A significant change was considered acceptable at P<0.05.

3.0 Results showing Lipid profiles of rats.

GROUP	HDL -c (U/I)	LDL-c (U/I)	TAG (U/I)	Cholesterol (U/I)	VLDL-c (U/I)
Group One (Control)	13.26± 2.29[a]	20.31±5.43	401.00 ± 47.69[c]	113.76 ± 3.77[d]	80.20±9.5 4
Group Two (Test Group)	381.48± 3.18[b]	27.68±19.0	180.85 ± 53.92[a]	85.20±15. 63[d]	36.17±10. 8
Group Three (Treatment Group 1)	21.47 ± 5.13[a]	158.21±21. 7	71.60 ± 29.35[b]	194.10 ± 17.63[d]	14.33±5.8 6
Group Four (Treatment Group 2)	48.53 ±6.64[a]	37.08±12.5	293.80 ± 111.11[c]	162.68 ± 14.40[d]	58.76±22. 2
Group Five (Treatment Group 3)	39.20 ±3.63[a]	18.66±6.9	200.20± 39.70[b]	97.82± 7.16[d]	39.96±7.8 8

Values are expressed as Mean ±SEM at significant level of $p<0.05$. Values on the same column with the same superscript are statistically not different, whereas values on the same column with different superscript are significantly different. Values are presented ± standard error of mean

aValues = values are significantly lower values than values down or within the treatment column.

bValues = values are significantly higher than the values before or within it in the treatment column.

cValues = Values are significantly higher values than values before it or with in the treatment column.

dValues= Values are significantly higher values than values before it or with in the treatment column.

eValues= Values are significantly higher values than values before it or with in the treatment.

4.0 DISCUSSION

Lead is considered very poisonous in any form it takes and path of entry into the body. It occurs in the environment in three major forms; Metallic lead, salts of lead and carbon-containing organic lead (Mohammed *et al*., 2016). The present investigation indicate that exposure to lead alters the metabolism of cholesterol and thus increases the risk of atherosclerosis and cardiovascular diseases in lead exposed Wister rats (Sharma *et al*, 2012). A complete cholesterol test or lipid profile test measures the amount of "good" and "bad" cholesterol and triglycerides is in the body.

Lipid and lipoprotein abnormalities play a major role in the progression of atherosclerosis and cardiovascular diseases (Sharma *et al*, 2012). In this study, male albino wistar rats were subjected to lead induction and they were evaluated. The rats were also subjected to fruit extracts to serve as treatment to the lead poison.

From these findings it is observed the significant increase in the level of concentration of the various parameters of the blood lipid profile from the normal control group to the case group (test group). The findings of this study indicate that lead exposure alters the metabolism of cholesterol and thus increases the risk of cardiovascular disease in lead-exposed subjects.

HDL and LDL are two of the four main groups of plasma lipoproteins that are involved in lipid metabolism and the exchange of cholesterol, cholesterol esters and triacylglyceride between tissues. According to (Amaechi *et al.*, 2015), Hypercholestemia has been identified as primary risk factor in development of CVD. This implies that, Preventing or reducing the serum levels is associated with reducing risk of CVD. In constrast, HDL-c plays a direct role in the atherogenic process. Therapeutic raising of HDL-c is widely encouraged.

LDL-Cholesterol results have shown to have generally unfavorable risk profiles for cardiovascular disease when compared with the control. The LDL concentration in group 2, 27.68±19.0 shows a significant increase ($p<0.05$) from the LDL concentration of group 1, 20.31±5.43 which represents a 45.86% increment. Epidemiological studies have shown that the elevated of total or LDL cholesterol in the blood are powerful risk factors for coronary disease. The HDL-cholesterol levels and between group 1(13.26± 2.29) and group 3 (21.47 ± 5.13) which shows the 61.9% increment. According to Kumar *et al* 2012, HDL protects the body against atherosclerosis. The findings of this study shows that the treatment groups of HDL has significant increase ($p<0.05$) in the HDL concentration levels compared to group 1 which indicates the fruit extracts generates favorable results as HDL (the good cholesterol) is increased. However, as shown above, the effect of lead on the LDL is the increment in its oxidation which is an important stage in atherogenesis. Smaller LDL particles are more likely to become oxidized, making them more detrimental to the health of an individual.

These level of the elevated concentrations due to lead induced toxicity subsequently reduces after being subjected to the juicy extracts of *Solanum melongena, Solanum lycopersicum and dacus carrot subsp.sativus.* This shows that the juice extracts of the fruits may be used as an effective treatment against lead induced toxicity.

5.0 CONCLUSION

The result suggests that the lead exposed Wister rats having altered lipid profile are at high risk of cardiovascular diseases and may be ameliorated by the combined therapy of fruit juice extract.

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