Effect of Graded Levels of Lipton Tea Extract on Haematological Parameter in Albino Wistar Rat (*Rattus norvegicus*)

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ABSTRACT

This study investigates the effects of graded levels of Lipton tea extract on the Haematological parameters in white albino rats (*Rattus norvegicus*). A total of 20 white albino rats weighing 120-160g, were divided into five (5) groups (I, II, III, IV, and V) of four rats per group. Doses of 50mg/kg/day, 250mg/kg/day, 500mg/kg/per, and 1000mg/kg/day of Lipton tea extract were orally administered for three weeks to treatment groups (II, III, IV, and V), while rats in group I were given only water and served as control. Blood samples were collected from the sacrificial animals to determine the effect of Lipton tea extract on haematological parameters (RBC, WBC, PCV, Hb, and platelet), liver enzymes (AST and ALT) & lipid profile (HDL, LDL, TG, and TC). The haematological analysis showed a significant difference (P<0.05) in WBC, but no significant difference (P>0.05) in the levels of RBC, PCV, Hb, and platelet compared to the control. Serum levels of AST and ALT showed significant difference (P<0.05) across the groups from the control. The lipid profile test showed no significant difference (P>0.05) in HDL, LDL, and TC from the control while TG was significantly different (P<0.05) from the control. The result of the study showed that Lipton tea has no negative effect in the blood.

Keywords: *Rattus norvegicus*, Lipton tea, Haematological parameters and liver enzymes

INTRODUCTION

Lipton Tea is one of the most popular tea brand and most consumed beverage in the world. It was first derived from the name of Sir Thomas Lipton and was the first packaged tea product in the United Kingdom. Humans are known to consume Lipton tea on a daily basis, whether in high or low doses. The Green tea is gotten from the tea plant *Camellia sinensis* belonging to the family Theaceae and it is cultivated in at least 30 countries around the world and commonly consumed in Japan, China, India, some parts of Africa, the United States, and Europe [1]. Recently, Lipton tea has been subjected to investigation in connection to its medical and health benefits, as well as the side effect of taking it in high doses. One of the few potential risk of drinking Lipton tea is that, it may cause insomnia or sleep disorder due to the caffeine content. But regular intake of Lipton tea might have more negative effects on humans which are still unknown. Therefore, the objective of this research is to investigate and discover the effect of Lipton tea extract intake on the haematological parameters in albino wistar rats, and to relate the result of this study in determining how regular consumption of Lipton tea will in turn affect humans and if it can as well affect the haematological parameters and physiology in man negatively. *Rattus norvegicus* (albino rats) are bred in animal houses and laboratories all over the world for experimental use in medicine and science due to its useful relationship with man [2]. The success of albino rats as a laboratory animal is largely related to its versatility in environmental and nutritional habits. Drinking Lipton tea regularly, has some nutritional values which include; boosting of memory and cognition, weight loss, control of blood sugar, immune system support and improves oral health. This Green tea is known to diminish the risk of several illnesses, such as cancer, diabetes and coronary heart disease [3]; [4]. Apart from the nutritional content of Lipton tea, studies have shown that its caffeine content may be responsible for any toxic effect. Caffeine increases the production of

stomach acid leading to peptic ulcers and erosive esophagitis. There have also been reported cases of central nervous systems symptoms like insomnia, restlessness, agitation, dizziness, and confusion etc. [5]. Chronic caffeine can alter the release of some neurotransmitters in the brain such as dopamine and catecholamine [6].

The haematological parameters to be studied comprises of the liver enzymes, haematology and lipid profile. Serum liver enzymes, Aspartate Aminotransferase (AST) and Alanine Transaminase (ALT), are biomarkers for liver damage. The lipid profile includes, high density lipoprotein (HDL), low density lipoprotein (LDL), Total Cholesterol, and Triglyceride. They are used for cardiac risk assessment and to determine the risk of heart diseases. The haematological components which includes red blood cell (RBC), white blood cell (WBC), packed cell volume (PCV), hemoglobin (Hb), mean corpuscular heamoglobin (MCH), and platelets, are indicators of the physiological status of animals [7].

MATERIALS AND METHODS

A total of 20 albino rats (*Rattus norvegicus*) weighing between 120-160g were obtained from the Faculty of Pharmaceutical Sciences, University of Port Harcourt. This research was carried out at the Department of Animal and Environmental Biology, University of Port Harcourt. The animals were acclimatize for one week before the commencement of treatment.

The Lipton tea extract was prepared using five packets of Lipton tea purchased from a supermarket. The rats were grouped into five (5), which are group I (control) and treatment groups (II, III, IV, and V), each having four (4) rats. The treatment groups were administered different concentrations of Lipton tea extract : 50mg/kg/day, 250mg/kg/day, 500mg/kg/day, and 1000mg/kg/day, while group I (control) were administered only water, for a period of three (3) weeks. At the end of the experimental period, the animals were anaesthetized with ether before it was humanely killed for blood sample collection. The blood was collected into a sterile ethylene diaminetetraacetic acid (EDTA) embedded vials and subjected to three different haematological analyses such as Lipid profile, Haematological parameters and liver enzymes. The analysis was performed at Lively Stones Med. Diagnosis Laboratory, Choba, Rivers State. Data was statistically analysed using one way analysis of variance (ANOVA). All data were expressed as mean values ± standard error of mean (Mean ±SEM). $P<0.05$ was considered as significant.

RESULTS

From the experiment carried out, the mean values of PCV (%) and Haemoglobin (g/dL) decreased from 40.25±0.9 to 38.6±0.45 and 13.40±0.3 to 12.92±0.1, with increasing concentrations of Lipton tea across the groups from the control (group I) to treatment groups (II, III, IV, and V). RBC ($\times 10^{12}$/L) increased in group II and decreased in group III, IV, and V with slight difference from the control. WBC ($\times 10^{9}$/L) increased significantly across the groups, from 4.50±0.2 to 6.70±0.5. While Platelet ($\times 10^{9}$/L) decreased from 262.5±17.5 to 220.0±28.6 in group II and III compared to group I (control) and increased from 250.0±25.5 to 295.0±22.5 in group IV and V. The experiment indicated a significant increase on the serum levels of AST and ALT. AST (U/L) increased from 68.3±14.4 in group I to 104.3±5.6 and 106.8±18.3 in groups II and III, and latter decrease to 72.3±6.8 and 50.3±7.2 in groups IV and V . while ALT (UL) increased from 30.5±3.2 in group I to 42.5±3.9, 38.5±3.4 and 38.3±3.4 in groups II, III, and IV while it decreased in group V to 27.5±1.7. The lipid profile of *Rattus norvegicus* showed that there were no significant difference in the mean values of Total Cholesterol (TC) across the different groups and Triglyceride (TG) values (mmol/L) were significantly decreased in groups IV and V compared to the control but groups II and III were not significantly different from the control. HDL (mmol/L) and LDL (mmol/L) showed no significant difference ($P>0.05$) between the control and group II, III, IV, and V.

Table 1: Effect of Lipton tea extract on Haematological parameters

PARAMETERS	GROUPS				
	I	II	III	IV	V
PCV (%0	40.25±0.9[a]	40.25±1.3[a]	38.75±1.5[a]	38.5±0.6[a]	38.6±0.5[a]
Hb (g/dl)	13.40±0.3[a]	13.40±0.5[a]	12.93±0.5[a]	12.83±0.2[a]	12.9±0.1[a]
RBC ($\times 10^{12}$/L)	5.98±0.1[a]	6.08±0.2[a]	5.78±0.2[a]	5.73±0.2[a]	5.73±0.1[a]
WBC ($\times 10^{9}$/L)	4.50±0.2[a]	5.65±0.^{2a}	6.05±0.4[a]	6.03±0.5[a]	6.70±0.5[b]
PLATELET ($\times 10^{9}$/L)	262.5±17.5[a]	237.5±14.9[a]	220.0±28.6[a]	250.0±25.5[a]	295.0±22.5[a]

Values are Mean ± S.E.M values with similar superscript in each row are not statistically different $P < 0.05$

Table 2: Effect of Lipton tea extract on liver enzymes: AST and ALT levels

PARAMETERS	GROUPS				
	I	II	III	IV	V
AST (U/L)	68.3±14.4[a]	104.3±5.6[b]	106.8±18.3[c]	72.3±6.8[a]	50.3±7.2[d]
ALT (U/L)	30.5±3.2[a]	42.5±3.9[b]	38.5±3.4[a]	38.3±3.4[a]	27.5±1.7[c]

Values are Mean ± S.E.M values with similar superscript in each row are not statistically different $P < 0.05$

Table 3: Effect of Lipton tea extract on Lipid profile

PARAMETERS	GROUPS				
	I	II	III	IV	V
T.C (mmol/L)	2.02±0.1[a]	2.34±0.3[a]	3.22±0.7[a]	1.92±0.2[a]	1.66±0.2[a]
T.G (mmol/L)	1.1±0.9[a]	1.33±0.7[a]	1.75±0.1[a]	0.89±0.1[b]	0.86±0.1[c]
HDL (mmol/L)	0.82±0.04[a]	0.75±0.13[a]	0.92±0.15[a]	0.65±0.11[a]	0.77±0.05[a]
LDL (mmol/L)	0.68±0.05[a]	0.76±0.29[a]	1.19±0.47[a]	0.90±0.16[a]	0.61±0.84[a]

Values are Mean ± S.E.M values with similar superscript in each row are not statistically different $P < 0.05$

DISCUSSION

The haematological study on the treatment of rats with Lipton tea extract caused significant difference ($P < 0.05$) in WBC count but no significant difference ($P > 0.05$) in RBC, PCV, Hb, and platelet values compared to the control group. The significant increase in WBC might indicate the presence of a foreign body in the blood of the animals which facilitated the generation of antibodies in the process of phagocytosis, thus, increasing the production of white blood cells to fight against infections [8].

The change in the values of AST and ALT indicated a significant difference ($P < 0.05$) between the treatment groups and the control. The decrease in the mean value of AST and ALT as shown in the group given the highest level of Lipton tea extract, is due to the antioxidant property of flavonoidal compounds of tea which decreases the oxidative stress of the liver [9]. It could also be a herbal products that have been seen to demostrate this characteristic of increased efficacy to peak and a decrease as the concentration of the herbal treatments increase [10]. The effect of Lipton tea extract on the lipid profile has a significant difference ($P < 0.05$) in TG and this is due to the fact that, green tea extract reduces triglyceride levels as a result of significant hypolipidemic action of polyphenols and catechins [11]. This is in agreement with [12] who stated that green tea has been associated with decrease in serum levels of triglyceride. Also, there was no significant difference ($P > 0.05$) between the treatment group and the control in HDL, LDL, and TC.

Hence, it could be deduced that Lipton tea has no significant effect on the above parameters. It can also be traced to the fact that animals lipid profile was not boasted as rats are known to have a low LDL HDL concentrations hence need arises to also feed the animals with hyper lipidemic meal . This was not done in course of this experiment hence differences in HDL and LDL were not significant.

CONCLUSION

This study provided insight into the possible effect of graded levels of Lipton tea intake in white albino rats and the extent to which it can affect the blood parameters of humans as well. In conclusion, the intake of graded levels of Lipton tea showed significant decrease in the serum levels of liver enzymes, AST and ALT, which indicates a low risk of having hepatocyte injuries. The haematological parameters such as RBC, PCV, Hb, and platelet count were not affected by Lipton tea consumption. However, it increased WBC counts which suggests that people who regularly consume Lipton tea have a low risk of having infections and diseases. Also, the resultant lipid profile due to the intake of Lipton tea, indicates a low of risk of having heart problems or cardiovascular diseases. And so, it is suggested that further research should be carried out to know the potential effect of regular intake of Lipton tea so as to mitigate against any negative effect.

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