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The Effect of Procold on the Blood: Biochemical Perspective

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Abstract— *There is an erratic intake of analgesics for the reduction and elimination of various categories of body pain without prejudice to expertise prescription. This study is carried out to evaluate the effect of one of the analgesics [Procold] on the biochemical indices of the Wistar rats. A total of 29 adult Wistar rats of both sexes weighing 136.7-265.3g fed with clean water and growers were used for this study. They were allowed to acclimatize for two weeks. LD50 was calculated using the [12] formula for the administration of samples, thus LD50 was 44.1mg/kg. In the main experiment, twenty (20) Wistar rats were divided into five (5) groups, marked group [I-V] and each group contains four (n=4) Wistar rats. The conversion was made of the Procold composition per the body weight of the human and consequently converted to animal [rat] dose using the conversion protocols of [13]. The solid Procold tablet [mg] was converted into [ml] and was dissolved in distilled water into a liquid solution, concerning the LD50 value and different concentrations of the various groups [44-14mg/kg] were calculated against the body weight of the Wistar rat for administration. Treatments were done thrice [3 times] daily, following the prescriptions of the drug. The treatment lasted for four [4] weeks. Group 1: Normal control group, received normal feed and water only as a placebo, Group 2: 44 ml/kg, Group 3: 34ml/kg, Group 4: 24ml/kg, and Group 5: 14mg/kg. The Wistar rats were weighed weekly and one rat was sacrificed through cervical dislocation from each group and blood was collected for biochemical analysis. The biomarkers include Aspartate Aminotransferase [AST], Alanine Transaminase [ALT], Alkaline Phosphatase [ALP], Total Bilirubin, Albumin, Creatinine, Urea, Total Protein, Total Cholesterol, and Lactate Dehydrogenase. Data collected from this research were analyzed using SPSS version 22.0. Descriptive statistics were done, and ANOVA was used to compare the mean value for statistical significance difference [$p<0.05$]. The results showed a significantly increased level in Aspartate Aminotransferase [AST] level in the treatment group (I) which is the highest dose (44mg/kg) and treatment group (III) (24mg/kg) which entails damage to the liver and other AST-producing tissues ($p<0.05$). No significant increase or decrease of Alanine Transaminase [ALT] in the various treatment groups, except for treatment group (I) which showed a significantly elevated level of ALT as against the control and Alkaline Phosphatase [ALP] in the treatment group (2). Total Bilirubin, Albumin, Creatinine, and Urea are seen to be stable in all treatment groups in comparison to the control group. There is an elevated level of the total protein in all treatment groups but, significantly recorded in the highest dose [treatment group 1] when compared with the control group. In this study, there is a significant reduction in the Total Cholesterol of all treatment groups (1-4) which could lead to hemorrhagic stroke. The level of Lactate Dehydrogenase in all treatment groups is insignificant in contrast with the control. In summary, the consumption of Procold drug poses no significant reno-toxic effect on the kidneys, and heart functions. Concurrently, the drug exacerbates hepatic dysfunction in the liver mass due to the induced elevation of AST. The constant intake of this drug could lead to cancer, and hemorrhagic stroke due to low levels of cholesterol. We, therefore, advise patients to strictly follow the prescript of the medical experts and avoid random intake of this drug.*

Keywords— *Procold, Biochemical Indices, Wistar rats.*

I. INTRODUCTION

Certain drugs and chemicals have been shown to adversely affect the functionality of the blood indices after intake or when exposed to them. Red blood cells exposed to ethanol concentration exhibited cell sphericities higher than those of normal cells, and significant decreases of Hb content and concentration in RBC cytoplasm at the lethal condition were observed. In addition, changes in RBC membranes increased significantly upon ethanol treatments, indicating ethanol-induced membrane fluidization [1]. A study to compare changes in various hematological and biochemical properties in stored blood was carried out. Plasma hemoglobin, red blood cell count, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, plasma sodium level, and plasma potassium level were estimated and the results showed a rise in plasma hemoglobin, plasma potassium level, and depletion of plasma sodium level. While plasma sodium level showed more reduction in CPDA bags as compared to CPD-SAGM bags; thus, Hematological and biochemical changes do occur in stored blood cells [2]. The toxicity of Yoyo cleanser bitters on biochemical functions of the liver and kidney of albino rats was investigated and the results indicate a minimal and non-significant increase of alkaline phosphatase (ALP), alanine aminotransferase (ALT), and aspartate aminotransferase (AST), albumin, creatinine, total bilirubin, and total protein, and a significant increase in serum levels of urea (10 and 15 mg/kg doses) and total cholesterol (TC) (5 and 10 mg/kg doses) on the treated groups [3]. Results from the study of Dr. Iguedo Goko Cleanser's poly-herbal formulation in Wistar albino rats showed that creatinine and ALT levels were lower, total bilirubin and albumin, ALP (5 and 15mg/kg), AST and total cholesterol (5 and 10mg/kg), total protein (5mg/kg) and urea (5, 10 and 15mg/kg) were observed to be higher.

Nephrotoxic potentials, hepatobiliary dysfunctions, and cholestatic alteration may result [4]. A study to evaluate

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natural and artificial ripened Pineapple (Ananas cosmosus) fruit juice on the Biochemical parameters of Wistar rats. AST, total bilirubin, total protein, and lactate dehydrogenase were observed to be higher when compared with the natural ripened group. Statistically, all biochemical parameters evaluated had significant differences at a 95% confidence level ($P < 0.05$), except creatinine, albumin, and total proteins. It is evident that the consuming calcium carbide ripened pineapple fruits formulated diets may cause myocardial infarction, hepatic dysfunction, and liver and heart diseases, therefore artificial ripening by the use of calcium carbide method should be discouraged [5]. Assessment of calcium carbide and naturally ripened pawpaw (Carica papaya) fruit on the biochemical parameters of the Wistar rats was conducted, and the mean values of total protein, total cholesterol, lactate dehydrogenase, and creatinine levels of calcium carbide ripened pawpaw fruit juice fed group were significantly higher when compared with the natural ripened pawpaw fruit juice. Meanwhile, albumin, total bilirubin, urea, ALT, AST, and ALP levels of calcium carbide ripened fruit juice fed group was lower when compared with the naturally ripened pawpaw fruit juice, conclusively, the elevated levels of creatinine, total cholesterol, and lactate dehydrogenase may result to kidney injury, cardiovascular and heart diseases [6]. Biochemical parameters of the Wistar rats were studied from calcium carbide ripened sweet orange (citrus Sinensis) with the resultant outcome of lower mean values of ALT, AST, ALP, total bilirubin, urea, lactate dehydrogenase and creatinine levels of calcium carbide ripened sweet orange fruit juice was significantly lower when compared to the natural ripened sweet orange fruit juice group. While, albumin, total protein, and total cholesterol levels of the calcium carbide ripened fruit juice group were slightly higher than the natural ripened sweet orange fruit juice group with significant differences of all the biochemical parameters except albumin and total protein at ($P < 0.05$) [7]. The biochemical parameters of the Pups from the Wistar rats fed with Calcium Carbide induced ripened orange were investigated, and the results narrate statistically significant increase in the mean AST, ALT, ALP, Creatinine, Urea, Total Bilirubin and Lactate Dehydrogenase of the pup of the Wistar rats fed with Calcium carbide forced ripened orange juice in contrast with the control group ($p<0.05$). A significant reduction in the mean Albumin, Total Protein, and Total Cholesterol in the pups from the Wistar rats fed with Calcium carbide forced ripened orange juice when compared with the control group ($p<0.05$), and conclude that there is nutritional programming of Calcium Carbide forced ripened fruit when consumed by a mother and could cause hepatic and/or extra-hepatic toxicity, renal failure, heart failure, coronary heart diseases of the offspring [8]. Evaluation of the toxic effect on the Biochemical indices of the second filial generation pup from the Wistar rats fed with Calcium Carbide forced ripened orange fruits were carried out, and the outcome showed, a reduction in all the tested indices; AST, ALT, ALP, Creatinine, Urea, Albumin, Total protein, Total Cholesterol, Bilirubin, Lactate Dehydrogenase [LDH] in the Second Filial Generation Pups of the Calcium Carbide treated Wistar rat. Nutrients from the fruit induced with Calcium Carbide consumed during pregnancy may permanently impact the developing fetus which can be expressed later in life [9]. Toxic assessment of Vino Gano Ginger and Herbal Liqueur on the Biochemical Parameters of the male Wistar rats were studied, and the results indicate significant elevation in mean AST, ALT, ALP, Urea, Creatinine, Total Cholesterol, and LDH of the Wistars treated with [5 ml/kg, 10 ml/kg and 15 ml/kg] of the Vino Gano Ginger and Herb Liqueur ($p<0.05$). A significant Total Protein reduction was recognized in the Wistar rats treated with Vino Gano Ginger and Herb Liqueur. There was a slight increase in Albumin in treatment group 1 [5 ml/kg] but the reduction was recorded in treatment groups II and III [10 ml/kg and 15ml/kg]. The continuous intake of Vino Gano Ginger and Herb Liqueur will pose a reno-toxic effect, Myocardial infarction, Cholestasis, Sarcopenia, leukemia, and other life treating conditions [10].

II. Materials and Methods

Materials

The materials used for this research include, Wistar rats, Procold drug, water, syringes, needles, hand gloves, Incubator, Oven, magnetic stirrer, centrifuge Model 800, cotton wool, Methylated spirit, EDTA bottles, normal sample bottles, Animal weighing balance, Water bath, and amongst others.

Fig. 1: Image of Procold Drug

Design of the Experiment

This is an experimental study of Wistar rats treated with different concentrations and doses of the Procold [drug] to evaluate the blood hematological indices.

A total of 29 adult Wistar rats of both sexes weighing 136.7-265.3g were used for this study. The Wistar rats were purchased from and kept at a standard environmental condition and were fed with clean water and growers mash [formulated rodent food at libitum in the animal house of Bayelsa Medical University. The Wistar rats were allowed to acclimatize for two weeks. The process followed the protocols of [11].

LD50 was calculated using the [12] formula for the administration of samples, thus LD50 was 44.1mg/kg. In the main experiment, twenty (20) Wistar rats were divided into five (5) groups, marked group [I-V] and each group contains four (4) Wistar rats.

Preparation and Administration of Treatment Sample

Procold is composed of 500mg of Paracetamol, 10mg of Phenylephrine, and 2mg of Chlorpheniramine. The conversion was made of the Procold composition per body weight of humans and consequently converted to animal [rat] dose using the conversion protocols of [13].

The solid Procold tablet [mg] was converted into [ml] and was dissolved in distilled water into a liquid solution, regarding the LD50 value and different concentrations of the various groups [44-14mg/kg] were calculated against the body weight of the Wistar rat for administration.

Administration of treatment sample was done thrice [3 times] daily, following the drug prescription which lasted for four [4] weeks.

Group 1: Normal control group, received normal feed and water only as a placebo.
Group 2: 44 ml/kg
Group 3: 34ml/kg
Group 4: 24ml/kg
Group 5: 14mg/kg

Collection of Blood and organ samples

The Wistar rats were weighed weekly and one rat was sacrificed through cervical dislocation from each group and blood was collected for biochemical analysis.

The biochemical parameters for Liver, kidney, and heart assay include Aspartate Aminotransferase [AST], Alanine Transaminase [ALT], Alkaline Phosphatase [ALP], Total Bilirubin, Albumin, Creatinine, Urea, Total Protein, Total Cholesterol, and Lactate Dehydrogenase

Analysis Of Data

Data collected from this research were analyzed using SPSS version 22.0. Descriptive statistics were done and ANOVA was used to compare the mean value for statistical significance difference [$p<0.05$].

III. RESULTS

The results obtained from the analysis of the biochemical indices of the Wistar rats treated with the Procold drugs are displayed in the tables below.

TABLE 1: Mean weight of adult wistar rats

GROUP 1 [CONTROL]	GROUP 2 [44mg/kg]	GROUP 3 [34mg/kg]	GROUP 4 [24mg/kg]	GROUP 5 [14 mg/kg]
160.23±6.04	179.58±4.66	180.28±18.53	171.48±11.29	184.98±31.42

MEAN±SEM

TABLE 2: Mean values of the biochemical indices

S/N	BIOCHEMICAL INDICES	GROUPI [CONTROL]	GROUP II [44mg/kg] [Treatment 1]	GROUP III [34mg/kg] [Treatment 2]	GROUP IV [24mg/kg] [Treatment 3]	GROUP V [14 mg/kg] [Treatment 4]
1	**Aspartate Aminotransferase [AST]**	98.31 ± 0.42^{W}	101.37 ± 0.38^{S}	98.54 ± 0.29^{W}	102.50 ± 0.61^{G}	98.70 ± 0.44^{W}
2	**Alanine Transaminase [ALT]**	41.52 ± 0.28^{A}	43.43 ± 0.26^{T}	40.29 ± 0.42^{A}	41.21 ± 0.32^{A}	42.57 ± 0.34^{A}
3	**Alkaline Phosphatase [ALP]**	54.56 ± 0.32^{Y}	$53.750.42^{Y}$	56.33 ± 0.34^{D}	54.06 ± 0.07^{Y}	54.63 ± 0.33^{Y}
4	**Total Bilirubin**	0.28 ± 0.04^{S}	0.24 ± 0.03^{S}	0.33 ± 0.03^{S}	0.27 ± 0.05^{S}	0.28 ± 0.04^{S}
5	**Albumin**	4.80 ± 0.46^{Q}	5.11 ± 0.20^{Q}	5.43 ± 0.26^{Q}	5.27 ± 0.18^{Q}	5.56 ± 0.26^{Q}
6	**Creatinine**	0.52 ± 0.03^{Z}	0.56 ± 0.02^{Z}	0.54 ± 0.02^{Z}	0.54 ± 0.01^{Z}	0.44 ± 0.02^{Z}
7	**Urea**	17.53 ± 0.29^{H}	16.80 ± 0.29^{H}	17.23 ± 0.38^{H}	16.47 ± 0.30^{H}	16.47 ± 0.26^{H}
8	**Total Protein**	8.87 ± 0.46^{F}	11.27 ± 0.58^{B}	10.60 ± 0.64^{F}	9.73 ± 0.35^{F}	9.16 ± 0.04^{F}
9	**Total Cholesterol**	68.96 ± 0.61^{P}	64.40 ± 1.45^{P}	60.50 ± 1.42^{J}	61.10 ± 1.74^{M}	63.00 ± 1.68^{P}
10	**Lactate Dehydrogenase**	152.56 ± 1.42^{R}	154.23 ± 0.43^{R}	153.33 ± 0.85^{R}	153.43 ± 0.84^{R}	152.63 ± 1.42^{R}

MEAN±SEM

Note: Means of different superscripts in the same row are statistically significant, and the means of the same superscript in the same row are statistically insignificant.

IV. DISCUSSION

Drugs are chemical substances synthesized from plants that promulgate a change in the physiology, psychology, and anatomy of living organisms when consumed. Biochemical assay on the blood of the Wistar rats treated with different doses of the Procold drug indicates a significantly increased level of Aspartate Aminotransferase [AST] level in the treatment group (I) which is the highest dose (44mg/kg) and treatment group (III) (24mg/kg) which entails damage to the liver and other AST producing tissues ($p<0.05$). In the word of [4], AST has both mitochondrial and cytoplasmic origin and any elevation could be taken as the first sign of cell damage that leads to the appearance of these enzymes in the serum. This finding is also in corroboration with the result of [3], that the rise in AST is an indicator of liver disease. Since AST is not specific to only liver function, its increase is a pointer to hepatic and/or extra-hepatic toxicity. According to [14], AST is found in many tissues e.g, skeletal muscle, heart muscle, and kidney if not all tissues. The rise in AST [enzyme] level are found in approximately 70 percent of the patient with myocardial infarction. Finding from this result showed no significant increase or decrease of Alanine Transaminase [ALT] in the various treatment groups, except for treatment group (I) which showed a significantly elevated level of ALT as against the control and Alkaline Phosphatase [ALP] in the treatment group (2). This upsurge could lead to chronic liver hepatitis. According to [8], A rise in ALT is commonly seen in

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conditions that caused blocked "ducts" such as bile stones or direct damage to the bile ducts. Damage to the liver makes it leaky and AST and ALT will be released into the bloodstream. From all indications in the analysis of these results, Total Bilirubin, Albumin, Creatinine, and Urea are seen to be stable in all treatment groups in comparison to the control group. There is an elevated level of the total protein in all treatment groups but, significantly recorded in the highest dose [treatment group 1] when compared with the control group. In this study, there is a significant reduction in the Total Cholesterol of all treatment groups (1-4) which could lead to hemorrhagic stroke. The result aligns with the findings of [8] on the assessment of the biochemical parameters on the first filial generation from the Wistar rats fed with calcium carbide ripened orange and they posited that very low levels of cholesterol may be associated with an increased risk of cancer, hemorrhagic stroke, depression, anxiety, preterm birth, and low birth weight. In the words of [15], The most frequent cause of non-cardiac death associated with low total cholesterol is cancer. The results in patients with coronary heart disease are associating low total cholesterol with an increased risk of non-cardiac death. The level of Lactate Dehydrogenase in all treatment groups is insignificant in contrast with the control.

V. CONCLUSION

The consumption of Procold drug poses no significant reno-toxic effect on the kidneys, and heart functions of the Wistar rats which have been indicated by their biomarkers. Concurrently, the drug exacerbates hepatic dysfunction in the liver mass due to the induced elevation of AST. Constant intake of this drug could lead to cancer, and hemorrhagic stroke due to low levels of cholesterol. We, therefore, advise patients to strictly follow the prescript of the medical experts and avoid random intake of this drug.

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Conflict of Interest

No conflict of interest.

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