



Research Paper

Effect of Procold On the Hematological Indices of the Wistar Rats.

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ABSTRACT

Hematological indices are indicators of the functionality of the blood cells concerning the low, normal, or high range. This study is aimed at evaluating the effect of the Procold drug on the hematological indices of the Wistar rats. A total of 29 adult Wistar rats of both sexes weighing 136.7-265.3g were used for this study. LD50 was calculated using nine (9) applying the protocol of [13] for the administration of samples. 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 [14]. The solid Procold tablet [mg] was converted into [ml] and was dissolved in distilled water into a liquid solution, referencing the LD50 value and different concentrations of the various groups [44, 34, 24, and 14mg/kg] were calculated against the body weight of the Wistar rat for administration. Oral administration of the treatments was done thrice [3 times] daily, following the prescriptions of the Procold drug. The treatment lasted for four [4] weeks. Group 1: The 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 samples were collected using EDTA bottles for the hematological assay. The hematological indices include White Blood Cell Count [WBC], Red Blood Cells Count [RBC], Hemoglobin [Hb], Hematocrit, Mean Corpuscular Volume [MCV], Mean Corpuscular Hemoglobin [MCH], Mean Corpuscular Hemoglobin Concentration [MCHC], Platelet, Lymphocytes, Mixed, Neutrophil. The data obtained was 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 significant reduction of the hemoglobin, hematocrit, and Mean Corpuscular Hemoglobin [MCH] levels and there was an upsurge in the level of platelet in all treatment groups. There is also a significant decrease in the White Blood Cell Count [WBC], and Lymphocytes, on the other hand, elevated Mixed, and Neutrophil of the treatment group (1) which had the highest dose. In conclusion, the oral Procold tablet is administered to eliminate cold, pain, flu, and fever. It is clear that the intake of this drug limits the production of packed cell volume (hematocrit level), minimizes oxygen transport to the tissues, reduces the shape of blood cells, causes anemia, and massive clot formation in the vascular walls leading to myocardial infarction and stroke. In a nutshell, taking a high dose of this drug causes generalized weakness, sedation, and reduced functional responses which were visible after the drug administration on the Wistar rats. We, therefore, recommend minimal intake of this drug to ensure healthy living.

Keywords: Hematological Indices, Procold, Wistar rats.

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I. INTRODUCTION

Procold [analgesic] tablet is a drug composed of Paracetamol, Phenylephrine, Chlorpheniramine, produced by Concept Pharmaceuticals Ltd. Procold is a rapid-acting pain-relieving drug for the treatment of cold, fever, headache, flu, and pain, especially backache, headache, arthritis and toothache, and cancer. Phenylephrine is an alpha-1 adrenergic agonist that raises blood pressure, and causes local vasoconstriction and pupil dilation, raising systolic and diastolic pressure. This increase in blood pressure will stimulate the vagus

nerve, causing reflex bradycardia. Blood dyscrasias could be caused by numerous drugs, from many pharmacotherapeutic groups with diverse chemical structures and with all application forms. Metabolism and distribution may influence the activity of drugs [1]. Hematological dyscrasias remain important because they are potentially fatal. Correct report of the

cause-effect is necessary for suspected adverse drug reactions (ADRs); to estimate their incidence; and, by risk-benefit analysis of such events, to introduce preventive measures to reduce their impact [2]. Hematological abnormalities are frequently encountered during treatment with antipsychotic drugs though some are mild and of no clinical significance [3]. Agranulocytosis is a rare, but serious and life-threatening hematologic disorder in the elderly. Idiosyncratic drug-induced agranulocytosis (IDIA) has been classically defined by a neutrophil count below $0.5 \times 10^9/L$ [4]. Increasing age and female sex have been considered risk factors for the development of this condition. The elderly take more drugs than younger people. This condition is most often associated with the intake of antibacterial agents, antiplatelets, antithyroid, antipsychotics, antiepileptics, and nonsteroidal anti-inflammatory drugs (NSAIDs). Initially, agranulocytosis may present without symptoms, but may quickly progress to severe infection and sepsis [4]. Bone marrow and peripheral blood cells may be adversely affected by drugs. Although the risk from most drugs is very small, many cases are reported because of the millions of doses of drugs taken each year by the population. Neutropenia, thrombocytopenia, hemolytic anemia, aplastic anemia, and macrocytic anemia are the commonest effects [5]. The consumption of fruits ripened with Calcium Carbide pose devastating effect on the bone marrow, and deleterious effect on the circulating blood, heart, and brain, which will even lead to myocardial infarction, Eosinophilia, Anemia, thrombocytopenia, paralysis, stroke, seizure and mortality may eventually arise [6]. Examination of the hematological indices of the Wistar rats fed With Calcium Carbide ripened Pineapple was studied and the results showed a significant reduction in mean PCV, Total white blood count [TWBC], Hemoglobin, Total red blood cells [TRBC], Platelets, Neutrophils. But there was an increase in lymphocytes, monocytes, and eosinophils. Calcium carbide causes various health hazards to humans even when consumed indirectly [7]. Some drugs and chemicals tend to pose illnesses from parent to offspring. A study was conducted to check nutritional programming on the second filial generation pups of the Calcium Carbide coerced orange juice-fed Wistar rats. The results showed a significant increase in PCV, hemoglobin, Total RBC, lymphocytes, and a reduction in Total WBC, Platelet, and Monocytes in the second filial generation pups from the Wistar rats fed with Calcium carbide coerced orange juice, thus evidence of nutritional programming in the second filial generation pups was recorded [8]. Also, a study on the first filial generation indicates reduced Packed Cell Volume, Total White Blood Count, Hemoglobin, Red Blood Cell Count, Platelets, and Lymphocytes, in the pups from the Calcium carbide-treated Wistar rats ($p > 0.05$). But there was an increase in Neutrophil, Monocytes, and Eosinophil levels of the pups from the Calcium carbide-treated group. Calcium carbide has shown a devastating effect on the hematological parameters of the Pups of the Wistar rats fed with Calcium carbide. Blood cells production is impeded due to its negative effect on hematopoietic stem cells, protection against foreign bodies is compromised due to low TWBC, resulting in tissue hypoxia, hemorrhage, and stunted growth and amongst other negative consequences; which are passed from parents to offspring [9]. The results of the negative effects of calcium carbide ripened orange on the hematological indices of the Wistar Rats showed a significant increase in mean PCV, hemoglobin, RBC, Lymphocytes, Monocytes, and Eosinophil while there was a significant reduction in Total White Blood Cell count, Platelet, Neutrophil level ($p < 0.05$) [10]. The curiosity for men to sexually satisfy women has been on the increase, thereby causing an overdose intake of herbal drinks and other substances; which is expressly raising health complications and untimely death during sex [11]. One such herbal dring is the VINO GANO GINGER and HERBAL LIQUOR which had shown to pose a devastating effect on Wistar rats. The Consumption of VINO GANO GINGER and HERBAL LIQUOR by a man to sexually satisfy a woman is a banquet of plague and index of death [11].

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, Sample bottles, Animal weighing balance, Water bath, and amongst others.



Figure 1: Image of the 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 the 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 [12].

LD50 was calculated using the [13] 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 [14].

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.

Oral administration of the sample was done thrice [3 times] daily, following the drug prescription and the process 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 Samples

In each week, the Wistar rats were weighed and one[1] was sacrificed through cervical dislocation from each group, and blood was collected using EDTA bottles for hematological analysis.

The hematological indices include White Blood Cell Count [WBC], Red Blood Cells Count [RBC], Hemoglobin [Hb], Hematocrit, Mean Corpuscular Volume [MCV], Mean Corpuscular Hemoglobin [MCH], Mean Corpuscular Hemoglobin Concentration [MCHC], Platelet, Lymphocytes, Mixed, Neutrophil.

ANALYSIS OF DATA

The data obtained was 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

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 HEMATOLOGICAL INDICES

S/N	HEMATOLOGICAL INDICES	GROUP 1 [CONTROL]	GROUP 2 [44mg/kg]	GROUP 3 [34mg/kg]	GROUP 4 [24mg/kg]	GROUP 5 [14 mg/kg]
1	White Blood Cell Count [WBC]	4.64±0.35 ^A	3.55±0.32 ^A	5.55±0.32 ^A	6.48±0.28 ^Z	5.17±0.22 ^A
2	Red Blood Cells Count [RBC]	6.86±0.50 ^B	6.58±0.28 ^B	6.27±0.16 ^B	3.73±0.20 ^Y	6.76±0.06 ^B
3	Hemoglobin [Hb]	13.49±0.29 ^D	12.50±0.30 ^D	12.19±0.16 ^D	7.46±0.29 ^Q	12.29±0.45 ^D
4	Hematocrit	44.51±0.30 ^T	40.03±0.58 ^F	38.57±0.61 ^H	25.20±0.67 ^M	38.57±0.85 ^V
5	Mean Corpuscular Volume [MCV]	64.60±0.87 ^W	61.03±0.61 ^D	61.30±0.57 ^T	65.21±0.48 ^W	57.40±0.32 ^S
6	Mean Corpuscular Hemoglobin [MCH]	19.57±0.38 ^C	19.00±0.58 ^C	19.20±0.58 ^C	19.20±0.58 ^C	18.18±0.48 ^C
7	Mean Corpuscular Hemoglobin Concentration [MCHC]	30.22±0.39 ^U	31.20±0.17 ^U	31.20±0.17 ^U	29.38±0.62 ^U	31.57±0.58 ^U
8	Platelet	634.30±0.91 ^T	859.97±0.55 ^Y	848.67±0.33 ^J	689.33±2.33 ^K	970.70±1.48 ^P
9	Lymphocytes	70.46±0.90 ^F	44.37±3.78 ^X	75.38±2.76 ^F	71.40±1.45 ^F	69.00±2.86 ^F
10	Mixed	7.43±0.26 ^G	14.36±0.86 ^N	7.43±0.26 ^G	10.36±0.75 ^B	10.43±0.32 ^P
11	Neutrophil	22.27±0.61 ^T	42.03±1.76 ^A	17.33±0.28 ^X	18.40±.32 ^T	20.66±.40 ^T

MEAN±SEM

Note: Means of different superscript the same row are statistically significant while, the means of same superscript in the same row are not significant.

IV. DISCUSSION

Blood cells especially, White blood cells are an important segment of the body's immune system. Whilst they are produced in the bone marrow, circulate in the bloodstream to combat infections, by invading fungi, bacteria, and other toxic germs. With recuse to the premise their count in the body of living organisms becomes important. In this study, the total white blood cell count is high in treatment groups (2-4) in comparison to the control group, which depicts infection, but reduced in the treatment group (1) which is the highest administered dose. This reduction explains the effect of Procold on the bone marrow that could lead to aplastic anemia, thereby weakening the immune system against invaders. There is no significant difference in the total red blood cell count among the various treatment groups except for treatment group (3) which showed depletion when compared with the control group. There is a depletion of hemoglobin in all treatment groups which is more significant in the treatment group (3). Hemoglobin binds oxygen in the lungs and transports it to the tissues and transports carbon (iv) oxide from the tissues to the lungs to maintain a balance for the survival of all cells, tissues, organs, and systems in the body. Reduction in hemoglobin will lead to tissue hypoxia, ischemia, and anemia. Several factors could cause hemoglobin depletion such as bone marrow to fail to produce the required amount [aplastic anemia], breakdown of the red blood cells [hemolysis], severe infections, drugs, nutrient deficiency, and kidney disease. These results agree with the findings of [6] on the assessment of Calcium Carbide ripened Pawpaw on the hematological parameters of the Wistar rats. The value of hematocrit (pack cell volume) is significantly low in all treatment groups in contrast to the control group ($p < 0.05$). This reduction is a clear indication of anemia. This finding corroborates the results of [6, 15]. There is a significant reduction in the Mean Corpuscular Volume [MCV] of the treatment groups and the control group. Mean Corpuscular Volume [MCV] is the average volume of red cells in a specimen. It is a measure of red blood cell size. Thus, the reduction is an outcome of microcytic anemia which is primarily caused by iron deficiency. The result from this study shows, a significant elevation of platelet (thrombocytes) in all treatment groups (table 2). Platelets are the smallest blood cells produced in the bone marrow and are responsible for blood clotting. This high platelet causes Reactive Thrombocytosis which could result primarily from infectious or inflammatory disorders, clonal thrombocytosis, or thrombocythemia resulting from abnormal platelet production by the bone marrow. This high platelet count also results in iron-deficiency anemia, leading to excessive clotting [thrombosis] thereby blocking major blood vessels supplying major organs like the heart and brain which could lead to myocardial infarction and stroke [11]. It is evident from this study (table 2) that the lymphocyte level is significantly low in the treatment group (1). Lymphocytes are distinctive in their responses [which could be either B or T- lymphocytes] and are blood cells that produce antibodies to combat infectious agents. Taking high doses of Procold drug could limit the production of lymphocytes, and inadvertently weaken the body's immune system to combat specific invaders. Consequently, there is diversity in the clotting time in the control

and treatment group (1) which tend to be higher significantly ($p < 0.05$) hence, the stoppage of bleeding in the vessels will be prolonged. Neutrophils are the first line of defense against foreigners and constitute half of the total white blood cells produced by the bone marrow. In this study (see table 2) there is a significant elevation of the neutrophil in the highest dose [treatment group 1] and a reduction in all other treatment groups. This elevation is an indication of a response to foreign invaders. The result is in tandem with the findings of [6].

V. CONCLUSION

The oral Procold tablet is administered to eliminate cold, pain, flu, and fever. It is clear that the intake of this drug limits the production of packed cell volume (hematocrit level), minimizes oxygen transport to the tissues, reduces the shape of blood cells, anemia, and massive clot formation in the vascular walls leading to myocardial infarction and stroke. In a nutshell, taking a high dose of this drug causes generalized weakness, sedation, and functional responses which were visible after the drug administration on the Wistar rats. We, therefore, recommend minimal intake of this drug to ensure healthy living.

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CONFLICT OF INTEREST

No conflict of interest.

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