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Effects of *Datura stramonium* crude ethanolic leaf extract on some hematological indices in adult male Wistar albino rats

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Abstract
Datura stramonium is a well-known medicinal plant with a long history of outstanding therapeutic applications, toxic properties as well as mind altering potentials. This 21-day research was aimed to explore the effects of varying doses of the plant's crude ethanolic leaf extract on certain physiological and hematological parameters due to adverse effects attributed to its common misuse. Twenty male Wistar albino rats were randomly divided into four groups of five rats each for oral administration of the extract: control group (no extract), low, medium, and high dosage groups (50, 100, and 200 mg/kg body weight of extract, respectively). Standard laboratory techniques were used for physiological and hematological analyses. In the low dose test group, there was a significant (p<0.05) increase in final body weight and blood glucose concentration compared to the control group. Hematological analysis showed no significant (p>0.05) changes in most Red Blood Cell (RBC) differentials, except for a significant (p<0.05) increase in Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin (MCH) in the low dose group. Mean Corpuscular Hemoglobin Concentration (MCHC) significantly (p<0.05) decreased in the high dose group. Platelet concentration significantly (p<0.05) increased in the high dose group, while Platelet Distribution Width (PDW) showed no significant (p>0.05) changes in all test groups compared to the control. Notably, there was a significant (p<0.05) increase in white blood cells, particularly lymphocytes, and a significant (p<0.05) decrease in monocytes and granulocytes in the medium dose group. This suggests that the rise in white blood cells, specifically lymphocytes, was due to increased production rather than an immune response. These results provide insights into the physiological and hematological effects of *Datura stramonium* extract, highlighting its potential therapeutic uses and emphasizing careful exploration of its immunomodulatory properties for improved medical interventions.

Keywords: Medicinal plants, *Datura stramonium*, Hematologicagical indices, Immunomodulatory, Toxicity

1. Introduction
The interest in medicinal plants has surged in recent years due to their abundance of bio-active compounds thought to underlie their therapeutic benefits [1]. *Datura stramonium* is a prime example of a plant with a long history of medicinal use, revered for its rich array of natural components. Numerous studies have demonstrated the presence of a variety of secondary metabolites in *Datura stramonium*, such as alkaloids, flavonoids, terpenoids, and coumarins, drawing attention to its potential health benefits. These intrinsic phytoconstituents exist in diverse concentrations and interactions, influenced by factors like plant genetics and environmental conditions, emphasizing the intricate pharmacological profile of *Datura stramonium* [2, 3]. Particularly, the tropane alkaloids in *Datura stramonium* have been extensively researched, unveiling new components and emphasizing their pharmacological importance, which could hold significant implications for disease prevention and treatment [2, 3].
Datura stramonium, a herbaceous plant from the Solanaceae family, is commonly known as Jimson weed or thorn apple. Originally native to North and South America, it has spread to different regions worldwide, including Nigeria. This plant has a rich history in traditional medicine, with its leaves, seeds, flowers, and roots traditionally used to treat various

ailments. In traditional medicine, the leaves of *Datura stramonium* have been specifically employed to alleviate conditions like Parkinson's disease, gastrointestinal disorders, irritable bowel syndrome, muscle spasms, menstrual cramps, asthma, and coughs as a respiratory decongestant (Jackson, 2010). The plant's antioxidant, anti-inflammatory, antispasmodic, anticoagulant, and anti-platelet properties align with its traditional uses for pain relief. The broad range of pharmacological activities exhibited by *Datura stramonium* positions it as a plant of interest for diverse medicinal applications, especially in managing respiratory issues and circulatory disorders [4].

Recent research indicates that the ethanolic leaf extract of *Datura stramonium* can positively influence hematological parameters in rats treated with methotrexate, demonstrating its potential to mitigate the adverse effects on blood parameters induced by specific substances [5]. Despite showing therapeutic potential in certain areas, *Datura stramonium* is known for its toxic effects, particularly due to its hallucinogenic properties and the risk of poisoning, especially through misuse [6]. Therefore, it is crucial to exercise extreme caution when using this plant.

Hematological indices serve as vital markers reflecting an individual's health status, offering insights into the generation, development, and role of blood cells, including red blood cells (RBCs), white blood cells (WBCs), and platelets. Deviations in these indices can signal various conditions like anemia, leukemia, and thrombocytopenia. *Datura stramonium* contains active compounds, notably toxic tropane alkaloids such as atropine, scopolamine, and hyoscyamine, which have the potential to influence hematological parameters [7]. These alkaloids, recognized for their pharmacological properties, can impact blood parameters by acting as competitive antagonists of muscarinic cholinergic receptors, affecting processes related to blood cell production and function [8, 9]. Tropane alkaloids are concentrated in various parts of the plant, with the ripe seeds containing the highest levels. Ingestion of any plant part, particularly the seeds, can lead to severe anticholinergic reactions and toxicity, underscoring the potential influence of these compounds on hematological indices [10]. Understanding the effects of these alkaloids on blood cell production and function is essential for a comprehensive evaluation of *Datura stramonium*'s impact on hematological health.

In addition to its complex biochemistry, the ethnobotanical heritage of *Datura stramonium* contributes a sense of mystique to its pharmacological characteristics. Esteemed as a sacred plant in numerous cultures globally for its medicinal, hallucinogenic, and spiritualistic attributes, *Datura stramonium* has served diverse purposes, ranging from pain management to inducing altered states of consciousness (hallucinations) [10]. It is essential to explore the effects of varying concentrations of *Datura stramonium* on hematological indices to better grasp its safety profile and therapeutic potentials [11].

The objective of this research was to examine the impact of different doses of *Datura stramonium* crude ethanolic leaf extract on specific hematological parameters in adult male Wistar albino rats. By investigating the potential therapeutic effects of the plant on blood cell function, this study aims to offer valuable insights and lay the groundwork for further exploration into its potential for treating various hematological conditions. This research can enhance our understanding of how *Datura stramonium* affects blood health, inform future studies on its therapeutic uses, provide essential data on its safety profile, and aid in evaluating potential risks associated with its utilization. This highlights the significance of exploring its potential protective properties on blood health, unveiling its anti-inflammatory mechanisms, and identifying potential therapeutic benefits.

Fig 1: *Datura stramonium* plant

2. Materials and Methods

2.1 Laboratory apparatus, equipment and chemicals

The following items were utilized in the laboratory: Accu-check glucometer, Hematology Auto Analyzer, Beakers (50 mls, 250 mls), Benchtop centrifuge, Ceramic plate, Conical flask (25 mls, 50 mls, 250 mls), Cotton wool, Dissecting set, Electric blender, Electronic weighing scale (Adventure Pro AV313), Measuring Cylinder, Plain test tubes, EDTA sample bottles, Plastic animal cage, Refrigerator, Spatula, Stirring glass rods, 2 ml Syringe, Water bath, Absolute ethanol, and Distilled water.

2.2 Collection, Identification, and Extraction of *Datura stramonium* Leaves

A sufficient amount of *Datura stramonium* leaves was gathered during the flowering season in 2023 from a garden located at Igbinedion University Okada, Edo state, Nigeria. The leaves were identified by a botanist in the Department of Biological Sciences at Igbinedion University Okada.

After thorough washing with water to eliminate dirt, debris, and contaminants, the harvested leaves were air-dried under shade for 72 hours and then briefly in an oven to eliminate all moisture. The dried leaves were blended to expand the surface area for extraction and ensure sample consistency.

Absolute ethanol was employed as a solvent to obtain the bioactive components from the powdered *Datura stramonium* leaves. The mixture was then subjected to maceration for 72 hours at room temperature (25 °C) with constant stirring to facilitate maximum extraction of the phytoconstituents. Following the maceration period, the extract was filtered using a mesh cloth to remove solid residues and plant particles. The filtrate was collected and concentrated using a water bath to allow the absolute ethanol to evaporate. The concentrated extract was recovered and stored in airtight containers in the refrigerator to prevent degradation until further use. The concentrated extract obtained from the ethanol extraction was appropriately reconstituted before being administered to the experimental animals.

2.3 Experimental Animals

Twenty adult male Wistar albino rats were randomly divided into four groups of five rats each: Group 1 served as the control and received only distilled water, Group 2 received 50 mg/kg body weight of the extract (low-dose), Group 3 received 100 mg/kg body weight of the extract (medium-dose), and Group 4 received 200 mg/kg body weight of the extract (high-dose).

The rats were acclimatized for two weeks and an initial weight was taken prior to the commencement of *Datura stramonium* reconstituted extract oral administration by gavage. The rats were housed in standard laboratory cages with controlled environmental conditions (temperature: 22 °C ± 2 °C, humidity: 55% ± 5%), and a 12-hour light-dark cycle. Standard rodent chow (growers mash) and water were provided ad libitum throughout the study period. The rats were closely monitored throughout for any signs of distress, abnormal behavior, or adverse reactions, with daily observations made regarding food intake, water consumption, and general well-being.

Upon completion of the 21-day treatment period, the animals were fasted overnight and weighed to collect the final body weight. The tail of each animal was pricked and blood was used for determining blood glucose concentration. The rats were then sacrificed by cervical dislocation, and blood required for the determination of hematological parameters was collected via cardiac puncture using a sterile syringe into sterile EDTA sample bottles.

2.4 Assessment of Body Weight Change and Percentage Change

The animals' initial weight was recorded before the commencement of extract administration, and the final weight was measured after the overnight fast at the conclusion of extract administration, just before sacrifice, utilizing an electronic weighing scale (Adventure Pro AV313). The percentage change in body weight was determined using the formula:

Percentage change in Body weight = (Wf - Wi) / Wi * 100
Where Wf = final weight; Wi = initial weight

2.5 Blood Glucose Concentration Measurement

A small prick was made on the tail of each rat, and the blood was applied to the acute one-touch test strips before being inserted into the Accu-chek glucometer to measure the blood glucose concentration.

2.6 Blood Sample Collection and Determination of Hematological Parameters: Blood samples needed for hematological parameter analysis were acquired via cardiac puncture using a sterile syringe into sterile sample bottles containing EDTA anticoagulant. Complete blood counts were conducted using the automated hematology analyzer Mythic 18. The analyzer's aperture facilitated the collection and measurement of hematological parameters. Whole blood was transferred between two electrodes through a small opening, allowing the automated hematology analyzer to count cells and generate data based on their size and structure. This process utilized the Wallace H. Coulter-patented Coulter Principle, employing optical measurement for cell counting and identification and electrical impedance for measuring cell sizes, enabling automation of white blood cell differentials [12]. Impedance analysis provided complete blood counts (CBCs) and three-part White Blood Cell (WBC) differentials (granulocytes, lymphocytes, and monocytes), as well as red blood cells and differentials (such as packed cell volume, hemoglobin concentration, red cell count, mean corpuscular hemoglobin concentration (MCHC), mean cell volume (MCV)), and platelets (PLT) and differentials (platelet distribution width (PDW)), which varied as cells passed through. The change in impedance being inversely proportional to cell volume allowed for cell count and volume measurements to be determined accurately.

2.7 Data Analysis

The gathered data underwent analysis through one-way analysis of variance (ANOVA) utilizing IBM Statistical Package for the Social Sciences (SPSS) software version 28 for Windows [13]. Results were presented as Mean ± standard error of mean (SEM). Statistical significance was determined at a P value below 0.05 ($p<0.05$) with a confidence level of 95%. Duncan's New Multiple Range test (SPSS, 2013) was employed to distinguish significantly different means.

3. Results

3.1 Impact of *Datura stramonium* Crude Ethanolic Leaf Extract on Wistar Albino Rat Body Weight

This study delved into the effects of varying doses i.e. low, medium and high (50, 100, and 200 mg/kg body weight

respectively) of *Datura stramonium* crude ethanolic leaf extract on the body weight alterations and percentage changes in Wistar albino rats over a 21-day period, as depicted in Figures 3.1a and 3.1b. The results indicated a noteworthy (p<0.05) increase in the final body weight solely in the low-dose treated group, while the other groups, including the control, exhibited insignificant (p>0.05) changes. This discrepancy was evident in the percentage changes in body weight across all groups.

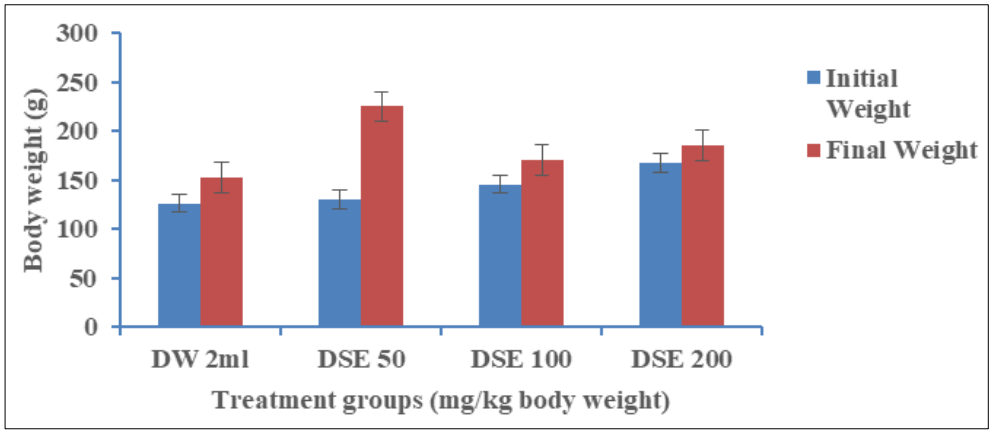

Fig 1a: The effect of *Datura stramonium* crude ethanolic leaf extract on the body weight of Wistar albino rats (DW = Distilled water, DSE = *Datura stramonium* ethanolic extract)

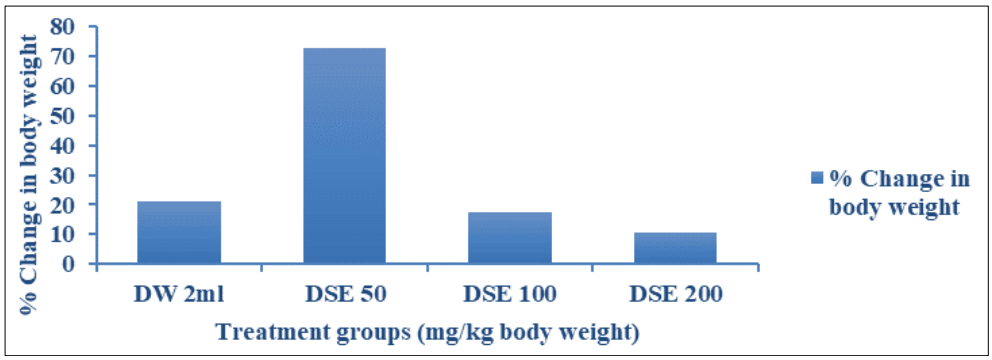

Fig 1b: The effect of *Datura stramonium* crude ethanolic leaf extract on the percentage change in body weight of Wistar albino rats (DW = Distilled water, DSE = *Datura stramonium* ethanolic extract)

3.2 Impact of *Datura stramonium* Crude Ethanolic Leaf Extract on Wistar Albino Rat Blood Glucose Levels

The influence of varying doses i.e. low, medium and high (50, 100, and 200 mg/kg body weight respectively) of *Datura stramonium* crude ethanolic leaf extract on the blood glucose levels of Wistar albino rats over a 21-day period is visually depicted in Figure 3.2. The findings revealed that the low-dose group displayed a significantly (P<0.05) higher blood glucose concentration compared to both the control group and the other treatment groups.

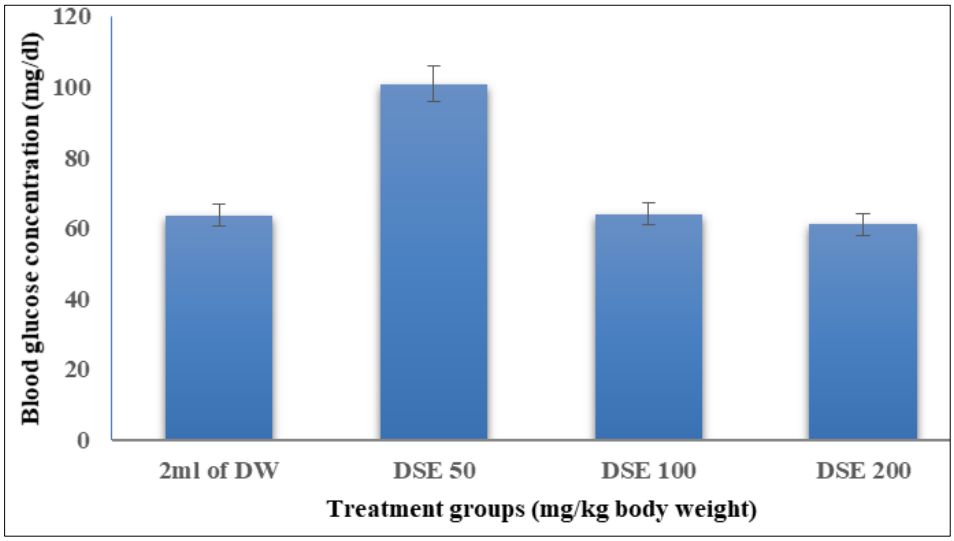

Fig 2: Effect of *Datura stramonium* crude ethanolic leaf extract on the blood glucose concentration (mg/dl) of Wistar albino rats. DW = Distilled water, DSE = *Datura stramonium* ethanolic extract

3.3 Impact of *Datura stramonium* Crude Ethanolic Leaf Extract on Wistar Albino Rat White Blood Cells and Differentials

The impact of different doses (50, 100, 200 mg/kg body weight) of *Datura stramonium* crude ethanolic leaf extract on white blood cells and their differentials is illustrated in Figures 3.3a and 3.3b, respectively. The findings revealed a significant (P<0.05) increase in total white blood cells in the medium-dose group (100 mg/kg body weight of the extract) compared to the control group. Furthermore, a dose-dependent rise in lymphocyte (LYM) percentage was noted across all treated groups, notably in the medium-dose group (100 mg/kg body weight of the extract) compared to the control, showing a significant increase (p<0.05). Conversely, there was a significant decrease (p<0.05) in monocytes and granulocytes, particularly in the medium-dose group (100 mg/kg body weight of the extract), compared to the control group.

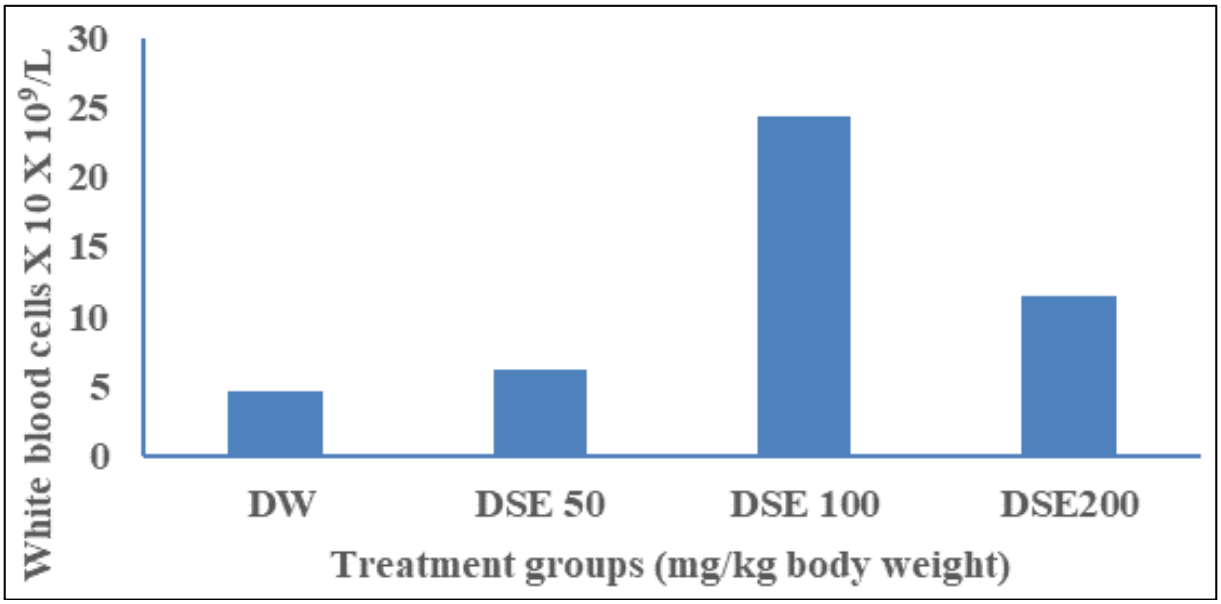

Fig 3a: The effect of *Datura stramonium* crude ethanolic leaf extract on white blood cells in Wistar albino rats (DW = Distilled water, DSE = *Datura stramonium* ethanolic extract)

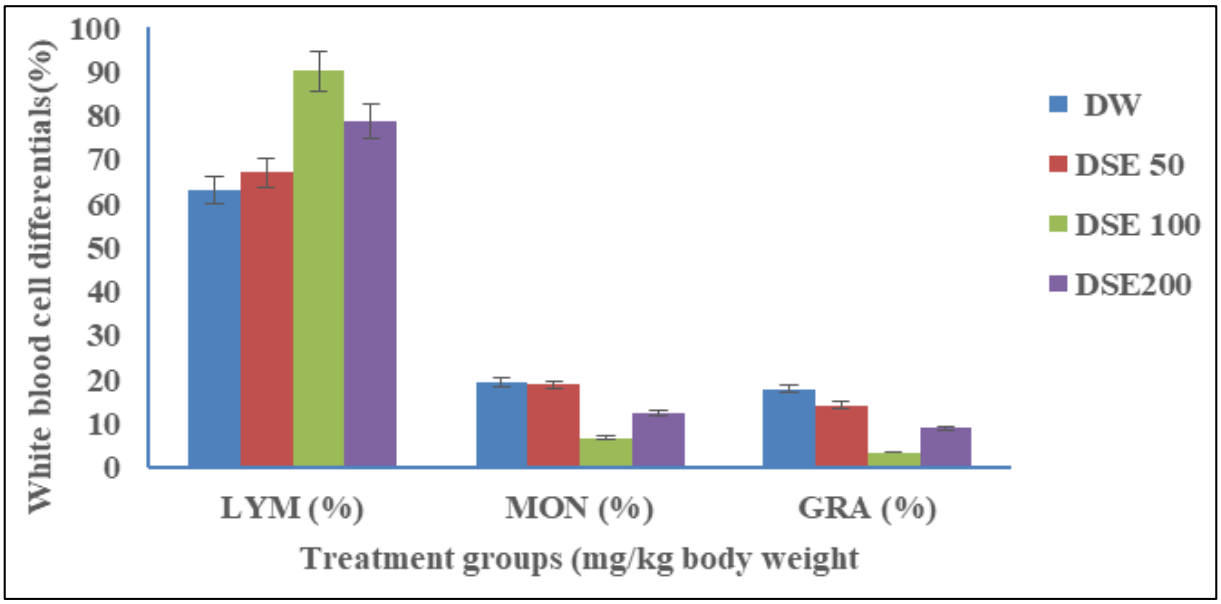

Fig 3b: The effect of *Datura stramonium* crude ethanolic leaf extract on some white blood cell differentials in Wistar albino rats (DE = distilled water, DSE = *Datura stramonium* ethanolic extract)

3.4 Impact of *Datura stramonium* Crude Ethanolic Leaf Extract on Wistar Albino Rat Red Blood Cells and Differentials

The impact of varying doses (50, 100, 200 mg/kg body weight) of *Datura stramonium* crude ethanolic leaf extract on red blood cells and their differentials in Wistar albino rats is detailed in Table 3.1. The analysis revealed no significant (P>0.05) alterations in Red Blood Cells (RBC), Hemoglobin (HGB), Packed Cell Volume (PCV), and Red Cell Distribution Width (RDW) in all treatment groups compared to the control group. However, a noteworthy (p<0.05) increase in Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin (MCH) was observed solely in the low-dose group compared to the control, with no significant (p>0.05) differences noted in the other treatment groups. Regarding Mean Corpuscular Hemoglobin Concentration (MCHC), an insignificant (p>0.05) rise was seen in the low-dose group (50 mg/kg body weight)

compared to the control, while a significant (P<0.05) decrease was evident in the other test groups (100 and 200 mg/kg body weight) compared to the control.

3.5 Impact of *Datura stramonium* Crude Ethanolic Leaf Extract on Wistar Albino Rat Platelets

The influence of low, medium, and high doses (50, 100, 200 mg/kg body weight, respectively) of *Datura stramonium* crude ethanolic leaf extract on the platelet concentration in Wistar albino rats over a 21-day period is detailed in Table 3.2. A significant (p<0.05) elevation in platelet (PLT) concentration was noted in the high-dose group (200 mg/kg body weight) compared to the control group, while the other treatment groups (50 and 100 mg/kg body weight) showed insignificant (p>0.05) changes relative to the control. Additionally, there were no significant (p>0.05) alterations observed in Platelet Distribution Width (PDW) across all test groups compared to the control.

4. Discussion

Herbal remedies have become increasingly popular in recent years as alternative treatments for a variety of health issues [1]. *Datura stramonium*, also known as Jimsonweed, is a medicinal plant with a rich history in traditional medicine. It contains diverse bio-active compounds that show promise in treating multiple diseases. Exploring the impact of *Datura stramonium* on blood-related parameters in rats can offer valuable insights into its potential as a natural remedy for blood disorders. This research is vital for uncovering its medicinal properties, healing effects, and toxicity profile due to the various secondary metabolites present in the plant, such as flavonoids, coumarins, saponins, tannins, and alkaloids. These compounds provide numerous health benefits, including antioxidant, anti-inflammatory, and anticoagulant properties. Hence, the presence of these metabolites aligns with the traditional uses of *Datura stramonium* for pain relief, circulatory issues, and other medicinal purposes. However, it is essential to account for the variability in concentrations and effects of these metabolites influenced by factors like plant genetics and environmental conditions to effectively evaluate safety and therapeutic potentials [14].

Body weight is commonly studied as a sensitive indicator of chemical-induced organ changes, reflecting disruptions in normal organism function. Notably, a marked increase in body weight was observed in experimental animals given a low dose (50 mg/kg body weight) of *Datura stramonium* crude ethanolic leaf extract compared to medium (100 mg/kg) and high (200 mg/kg) doses, suggesting a potential positive impact on weight gain. This disparity in weight gain among different dosages offers insights into the dose-response relationship and pharmacological effects of the extracts. The study sheds light on how *Datura stramonium* extract affects body weight changes in Wistar albino rats, aligning partially with previous research by Njoya *et al*. [15] on *Tapinanthus preussii* extracts. The observed weight gain, particularly at the low dose, hints at the extract's potential weight-gaining properties. This significant weight increase at the lower dose compared to higher doses may indicate a threshold concentration below which the extract's effects are not evident. Various doses of the plant extract could impact hormonal regulation, appetite control, or metabolic pathways differently. Noteworthy weight gain at the low dose, might indicate selective hormonal modulation targeting pathways or receptors that promote weight gain, such as glucagon. Factors like nutrient absorption, energy expenditure, and changes in gut microbiota composition influenced by the extract could contribute to the observed weight gain. Glucagon, an anabolic hormone known for its prolonged impact on body weight and blood glucose levels, may have been triggered by the low dose of the extract. Contrary to insulin, glucagon stimulates the release of glucose from the liver into the bloodstream, potentially elevating blood sugar levels and, if unregulated, contributing to gradual weight gain [16, 17]. The contrasting weight gain at low doses versus no significant change at higher doses could help establish a dose-response relationship. In essence, weight gain at a low dose relative to medium or high doses of an extract offers valuable insights into its pharmacological effects, dose-response patterns, and potential implications for therapeutic use and safety evaluations.

The notable rise in blood glucose levels at a low dose of *Datura stramonium* compared to medium and high doses may stem from multiple factors. One potential explanation is that certain components of the plant extract could have a more pronounced impact on glucose metabolism at lower doses, resulting in a more significant effect on blood glucose levels. Furthermore, the bioavailability and interactions of the active compounds in the extract at different doses could influence the modulation of glucose concentrations. Understanding the intricate pharmacological profile of *Datura stramonium* and how diverse dosages can elicit varied physiological responses is crucial in comprehending the differential effects on blood glucose regulation [16, 18]. The process by which *Datura stramonium* regulates blood sugar levels involves a variety of factors related to the bioactive components like alkaloids, tannins, carbohydrates, and proteins found in it. Notably, alkaloids such as atropine and scopolamine present in *Datura stramonium* are involved in regulating glucose metabolism, potentially enhancing either insulin sensitivity or secretion, resulting in decreased blood glucose levels. Furthermore, *Datura stramonium* may offer antioxidant benefits that shield pancreatic beta cells, crucial for insulin synthesis, from harm, thereby enhancing glucose control. The plant's constituents could also impact cellular glucose uptake or hinder enzymes involved in glucose production, thereby contributing to its antihyperglycemic properties as indicated by studies [5, 17, 19, 20]. Several studies have been carried out where *Datura stramonium* has displayed notable effects on blood sugar levels when compared to other plant extracts. Research indicates that extracts from *Datura stramonium*, such as the hydromethanolic root extract and the 80% methanolic leaf extract, possess antihyperglycemic properties by reducing blood glucose levels in diabetic mice post-treatment [16]. Moreover, the ethanolic leaf extract of *Datura stramonium* has exhibited healing effects against methotrexate-induced blood-related issues, suggesting its potential in addressing conditions like diabetes mellitus [5]. The chemical composition of *Datura stramonium* leaf and seed extracts also reveals the presence of active compounds that contribute to its abilities in managing diabetes and providing antioxidant benefits [5]. Overall, *Datura stramonium* distinguishes itself for its significant influence on blood glucose control compared to other plant extracts, underscoring its promise as a natural solution for diabetes management.

This research also examined how varying dosages of *Datura stramonium* crude ethanolic leaf extract affected white blood cells and their differentials. Findings revealed that the medium dose group (100 mg/kg body weight) demonstrated a notable rise in total white blood cells compared to the control group. This increase implies that the *Datura stramonium* crude ethanolic leaf extract at this specific dosage could activate the immune system, resulting in an increased count of white blood cells essential for combating infections and maintaining overall health [21]. Additionally, the dose-dependent increase in lymphocytes, particularly in the medium dose group, suggests a targeted enhancement of this specific type of white blood cell involved in immune responses. Conversely, the significant reduction in monocytes and granulocytes, especially in the medium dose group, may indicate a selective influence on these cell types, potentially affecting inflammatory responses or other immune functions [20]. These results underscore the intricate and potentially advantageous immunomodulatory effects of *Datura stramonium* extract at varying doses on white blood cell populations. The decline in these types of white blood cells could suggest a targeted influence on the immune response, potentially impacting inflammatory processes or other immune functions. Such modulation could prove beneficial in certain scenarios, like mitigating excessive inflammation or modifying immune responses to specific triggers [5].

This research also examined the impacts of varying doses of *Datura stramonium* crude ethanolic leaf extract on red blood cells and their differentials. The findings indicated no significant alterations in the levels of Red blood cells (RBC), Hemoglobin (HGB), Packed cell volume (PCV), and Red cell distribution width (RDW) across all treatment groups compared to the control group. This consistency in RBC indices indicates that the extract likely did not induce substantial changes in red blood cell count, hemoglobin levels, volume, or variability in cell size within the experimental groups. The steady values of these parameters suggest that the extract did not trigger significant modifications in these essential hematological markers at the administered doses [14, 22, 23, 24]. However, a noteworthy increase in Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin (MCH) was observed solely in the low dose group when compared to the control group. The rise in Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin (MCH) observed in the low dose group may suggest specific impacts on red blood cell characteristics. An increased MCV indicates larger red blood cells, while a higher MCH signifies a greater amount of hemoglobin within each cell. These shifts could indicate changes in red blood cell size and hemoglobin content, potentially affecting oxygen-carrying capacity and overall blood health. Analyzing these fluctuations in MCV and MCH levels can offer insights into how the extract influences red blood cell structure and function, underscoring its potential effects on hematological parameters in the low dose group [20, 25]. Furthermore, there was a negligible rise in Mean Corpuscular Hemoglobin Concentration (MCHC) in the low dose group in contrast to the control, while a significant decrease in MCHC was noted in the other test groups (100 and 200 mg/kg body weight) compared to the control group. The negligible increase in Mean Corpuscular Hemoglobin Concentration (MCHC) at the low dose suggests that the impact of the low dose on MCHC levels was minimal and not statistically significant compared to the control group. This slight rise may indicate a subtle effect on MCHC but is not substantial enough to be considered significant when contrasted with the control group. It implies that the low dose did not lead to a notable change in MCHC levels, distinguishing it from the significant decrease observed in the higher dose groups [26]. Possible causes of a decrease in Mean Corpuscular Hemoglobin Concentration (MCHC) include various factors related to anemia and inflammation.

The influence of different doses of *Datura stramonium* crude ethanolic leaf extract on the platelet concentration illustrates dose-dependent effects. Specifically, the high dose group (200 mg/kg body weight) demonstrated a significant increase in platelet (PLT) concentration compared to the control group, suggesting a potential stimulating impact on platelet production or activity at this dosage. In contrast, the low and medium dose groups (50 and 100 mg/kg body weight) did not exhibit notable changes in platelet concentration relative to the control group. The minor variations in platelet concentration in the low and medium dose groups may be influenced by factors such as platelet counting methods, variations in platelet size, underlying conditions affecting platelet production and breakdown [27, 28, 29]. The mechanism behind the increase in platelet concentration in the high dose group can be attributed to the stimulating effect of the extract on platelet production or activity. The high dose of the extract likely triggers a response that results in an elevated platelet count in Wistar albino rats. This elevation in platelet concentration may stem from the extract's influence on platelet formation in the bone marrow, platelet activation, or a combination of these factors. The extract at a higher concentration may enhance platelet production or inhibit platelet destruction, ultimately leading to a significant elevation in platelet levels compared to the control group. This interpretation aligns with the concept that bioactive substances can modulate platelet dynamics, affecting hemostasis and thrombus formation, as observed in the study on high-dose antithrombin supplementation where high concentrations of antithrombin led to a dose-dependent suppression of platelet function and blood coagulation [29, 30, 31]. The lack of substantial changes in Platelet Distribution Width (PDW) observed across all test groups suggests that the extract did not have a significant impact on the size variation of platelets. These results imply that while the high dose of *Datura stramonium* extract may influence platelet concentration significantly, PDW remained unaffected by the administered doses [20]. The relevance of PDW-SD (Platelet Distribution Width - Standard Deviation) in the absence of significant differences among all test groups and the control group lies in its function as a parameter reflecting the diversity in platelet size. When PDW-SD shows no notable variance across the test groups relative to the control group, it indicates uniformity in the distribution of platelet sizes among the different experimental conditions. This uniformity suggests that despite potential differences in platelet concentration or other factors, the platelets in the various groups exhibit similar sizes and distribution patterns. In the realm of platelet research, PDW-SD serves as a valuable measure for evaluating platelet heterogeneity, offering insights into platelet dynamics and potential variations in platelet function based on size diversity [32].

Table 1: The impact of low, medium, and high doses (50, 100, 200 mg/kg body weight, respectively) of *Datura stramonium* crude ethanolic leaf extract on red blood cells and their differentials in Wistar albino rats.

	RED CELL AND DIFFERENTIALS						
Treatment/group (P.O.) mg/kg b.wt	**RBC (x 10^12/ L)**	**HGB (g/dl)**	**PCV (%)**	**MCV (FL)**	**MCH (Pg)**	**MCHC (g/dl)**	**RDW**
DW	7.26 ± 0.28^{a}	11.86 ± 0.50^{a}	32.40 ± 0.75^{a}	45.00 ± 1.87^{b}	16.00 ± 0.84^{b}	36.00 ± 0.84^{a}	22.20 ± 1.83^{a}
DSE 50	6.38 ± 0.34^{a}	12.12 ± 0.68^{a}	32.8 0 ± 1.85^{a}	51.20 ± 0.58^{a}	18.40 ± 0.24^{a}	36.40 ± 0.24^{a}	20.00 ± 1.82^{a}
DSE 100	5.99 ± 1.31^{a}	11.80 ± 0.34^{a}	35.4 0 ± 1.44^{a}	46.80 ± 1.59^{b}	16.80 ± 0.49^{ab}	35.20 ± 0.58^{ab}	20.60 ± 0.93^{a}
DSE200	6.76 ± 0.91^{a}	10.60 ± 1.31^{a}	31.40 ± 3.99^{a}	47.20 ± 0.97^{ab}	16.20 ±0.37^{b}	32.40 ± 1.89^{b}	20.40 ± 0.51^{a}

Values are presented as mean ± Standard Error of Mean (SEM). DW denotes Distilled Water, while DSE represents *Datura stramonium* ethanolic extract. Different lettered superscripts following means in the same column indicate significant differences (p<0.05), whereas identical lettered superscripts denote similarity or lack of significant difference (p>0.05).

Table 2: Impact of *Datura stramonium* Crude Ethanolic Leaf Extract on Platelet Levels in Wistar Albino Rats

	Blood Parameters	
Treatment/group (P.O.) mg/kg b.wt	**PLT (x10^9/L)**	**PDW-SD**
DW	672.0 ± 0 54.92^{b}	32.80 ± 2.44^{a}
DSE 50	841.20 ± 109.07^{ab}	34.00 ± 2.66^{a}
DSE 100	848.60 ±110.92^{ab}	32.00 ± 0.55^{a}
DSE200	1220.20 ± 238.51^{a}	33.40 ± 1.54^{a}

Values are presented as mean ± Standard Error of Mean (SEM). DW denotes Distilled Water, while DSE represents *Datura stramonium* ethanolic extract. Different lettered superscripts following means in the same column indicate significant differences (p<0.05), whereas identical lettered superscripts denote similarity or lack of significant difference (p>0.05).

5. Conclusion

This research has provided significant insights into the pharmacological potential associated with the dose-dependent effects of *Datura stramonium* crude ethanolic extract in Wistar albino rats. Analyzing the impact of this plant on hematological indices has yielded valuable information regarding its safety profile and possible therapeutic uses. By investigating how this potent plant affects blood parameters, the study has illuminated the potential health benefits and risks linked to exposure to *Datura stramonium*. Through a thorough assessment of its influence on red blood cells, white blood cells, platelets, and coagulation profiles, this research contributes to a more profound comprehension of using *Datura stramonium* responsibly for therapeutic purposes while safeguarding human health and exploring its potential therapeutic applications. This study lays the groundwork for future research efforts aimed at effectively harnessing the medicinal properties of *Datura stramonium* while addressing any associated risks.

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