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Necrotic and Inflammatory Changes on Acute Studies of Siam Leaf (*Chromolaena Odorata)* Alcoholic Extract on Lead Induced Toxicity of Cardio-Pulmonary Morphology of Adult Albino Wistar Rats.

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Abstract

Human exposure to lead and its compounds occurs mostly in lead related occupations with various sources like leaded gasoline, industrial processes such as smelting of lead and its combustion, pottery, boat building, lead- based painting, lead containing pipes, battery recycling, grids, arm industry, pigments, printing of books, etc. Though its widespread use has discontinued in many countries of the world, it is still used in many industries like car repair, battery manufacturing and recycling, refining, smelting, etc. Lead is a highly poisonous metal affecting almost every organ in the body. Of all the organs, the nervous system is the mostly affected target in lead toxicity, both in children and adults. The toxicity in children is however of a greater impact than in adults. This is because their tissues, internal as well as external, are softer than in adults. Long-term exposure of adults can result in decreased performance in some tests of cognitive performance that measure functions of the nervous Cardio-pulmonary system. Cardio-pulmonary effects of alcoholic leaf extract of *Chromolaena odorata*, a plant commonly used for traditional medications, was evaluated using male Wistar albino rats. Acute and sub chronic toxicity was evaluated after 14 days of exposure. The LD50 was 2154mg/kg. Alcoholic leaf extract of *Chromolaena odorata* used in traditional medical practice may be safe whereas high doses may have deleterious effect on the heart and lungs. Twenty-five male Wistar rats weighing 100 -160 g were used for this study. The rats were kept five each in groups A to E, totaling 25. Group A (control) was allowed diet free of Lead and were not treated with any of the extracts. Group B were administered Lead intraperitoneally. Groups C were fed and administered intraperitoneally with Lead and treated with 800mg/Kg body weight of alcoholic extract respectively. Group D were also fed with food, water, dose of Lead and alcoholic Extract of *C. Odorata* with 400mg/kg body weight and Group E were given food, water and a high dose of the alcoholic Extract which was 800mg/kg body weight respectively. Both doses of extracts were administered daily to the rats using oro-gastric tube in line with body weights. The duration of this study was (21) twenty-one days after which the rats were sacrificed under sedation with chloroform. Organs were collected, fixed in 10% formal saline, processed, sectioned and stained using Haematoxylin and Eosin staining procedure at the Histopathology laboratory of Niger Delta Teaching Hospital (NDUTH), microscopically examined at X10 and X40 magnifications for histopathological diagnosis. Results showed degenerative changes in the heart and lungs of some of the experimental adult albino wistar rats.

Keywords: *Chromolaena Odorata,* Wistar rat, Lead, Cardio-pulmonary, Inflammatory changes.

Introduction

Lead is the most important toxic heavy element in the environment. Due to its important physico-chemical properties, its use can be retraced to historical times. Globally it is an abundantly distributed, important yet dangerous environmental chemical. It is important

properties like softness, malleability, ductility, poor conductibility and resistance to corrosion seem to make difficult to give up its use. Due to its non-biodegradable nature and continuous use, its concentration accumulates in the environment with increasing hazards (Hauser *et al.,* 2017).

Human exposure to lead and its compounds occurs mostly in lead- related occupations with various sources like leaded gasoline, industrial processes such as smelting of lead and its combustion, pottery, boat building, lead based painting, lead containing pipes, battery recycling, grids, arm industry, pigments, printing of books, etc. Though its widespread use has discontinued in many countries of the world, it is still used in many industries like car repair, battery manufacturing and recycling, refining, smelting, etc. Lead is a highly poisonous metal affecting almost every organ in the body. Of all the organs, the nervous system is the mostly affected target in lead toxicity, both in children and adults. The toxicity in children is however of a greater impact than in adults. This is because their tissues, internal as well as external, are softer than in adults. 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 behavioural problems, learning deficits and lowered IQ (Hauser *et al.,* 2017).

Long-time exposure to lead has been reported to cause anaemia, along with an increase in blood pressure mainly in old and middle-aged people. Severe damage to the brain and kidneys, both in adults and children, were found to be linked to exposure to heavy lead levels resulting in death. In pregnant women, high exposure to lead may cause miscarriage. Chronic lead exposure was found to reduce fertility in males. Blood disorders and damage to the nervous system have a high occurrence in lead toxicity (Hauser *et al.,* 2017).

Lead is a chemical element with the symbol Pb (from the Latin plumbum) atomic number 82. It is a heavy metal that is denser than most common materials. Lead is soft and malleable, and also has a relatively low melting point. When freshly cut, lead is silvery with a hint of blue; it tarnishes to a dull gray color when exposed to air. Lead has the highest atomic number of any stable element and three of its isotopes are endpoints of major nuclear decay chains of heavier elements. Lead is a relatively unreactive post-transition metal. Its weak metallic character is illustrated by its amphoteric nature; lead and lead oxides react with acids and bases, and it tends to form covalent bonds. Compounds of lead are usually found in the +2-oxidation state rather than the +4-state common with lighter members of the carbon group. Exceptions are mostly limited to organolead compounds. Like the lighter members of the group, lead tends to bond with itself; it can form chains and polyhedral structures (Beeman *et al*., 2013).

Since lead is easily extracted from its ores, prehistoric people in the Near East were aware of it. Galena is a principal ore of lead which often bears silver. Interest in silver helped initiate widespread extraction and use of lead in ancient Rome. Lead production declined after the fall of Rome and did not reach comparable levels until the Industrial Revolution. In 2014, the annual global production of lead was about ten million tonnes, over half of which was from recycling. Lead's high density, low melting point, ductility and relative inertness to oxidation make it useful. These properties, combined with its relative abundance and low cost, resulted in its extensive use in construction, plumbing, batteries, bullets and shot, weights, solders, pewters, fusible alloys, white paints, leaded gasoline, and radiation shielding (Bretherick *et al*., 2016).

In the late 19th century, lead's toxicity was recognized, and its use has since been phased out of many applications. However, many countries still allow the sale of products that expose humans to lead, including some types of paints and bullets. Lead is a neurotoxin that accumulates in soft tissues and bones; it damages the nervous system and interferes with the function of biological enzymes, causing neurological disorders, such as brain damage and behavioral problems. Lead also affects general health, cardiovascular, and renal systems (Betherick *et al*., 2017).

Pure lead has a bright, silvery appearance with a hint of blue (Beiner *et al*., 2015). It tarnishes on contact with moist air and takes on a dull appearance, the hue of which depends on the prevailing conditions. Characteristic properties of lead include high density, malleability, ductility, and high resistance to corrosion due to passivation. Bulk lead exposed to moist air forms a protective layer of varying composition. Lead (11) carbonate (PbCO3) is a common constituent; the sulfate or chloride may also be present in urban or maritime settings. This layer makes bulk lead effectively chemically inert in the air. Finely powdered lead, as with many metals, is pyrophoric and burns with a bluish-white flame (Bahrara *et al*., 2006).

Fluorine reacts with lead at room temperature, forming lead (11) fluoride. The reaction with chlorine is similar but requires heating, as the resulting chloride layer diminishes the reactivity of the elements. Molten lead reacts with the chalcogens to give lead (11) chalcogenides (Harbison *et al*., 2015).

Lead metal resists sulfuric and phosphoric acid but not hydrochloric or nitric acid; the outcome depends on insolubility and subsequent passivation of the product salt. Organic acids, such as acetic acid, dissolve lead in the presence of oxygen. Concentrated alkalis will dissolve lead and form plumbites (Guruswamy *et al.,* 2000).

Chromolaena odorata is a tropical and subtropical species of flowering shrub in the sunflower family. It is native to the Americas, from Florida and Texas in the United States South through Mexico and the Caribbean to South America (Neesom *et al*., 2006). It has been introduced to tropical Asia, West Africa, and parts of Australia (Chen *et al*., 2014).

Material and Method

Location of Study

The study was carried out in Department of Medical Laboratory Science, Faculty of Basic Medical Sciences, College of Health Sciences, Niger Delta University, Wilberforce Island Amasomma, Bayelsa state.

Identification

The plant for this study, *Chromolaena Odorata* was identified by Dr. Gideon Alade of the Department of Pharmacognosy, Faculty of Pharmacy, Niger Delta University Wiberforce Island, Amassoma, Bayelsa state.

Extraction of Chromolaena Odorata

The Plant material, *Chromolaena odorata* leaves were collected within the locality of Amassoma in Southern Ijaw Local Government Area of Bayelsa state, Nigeria and were identified in the Department of Pharmacognosy, Faculty of Pharmacy, Niger Delta University, Nigeria. The leaves of *Chromolaena Odorata* were dried under room temperature with further drying using an oven and ground to fine powder using an electric grinder. Approximately 250 g of the grounded sample was weighed using an electronic weighing balance and dissolved in 1000mL of absolute ethanol. This was properly mixed and allowed to stand for 48 hours, after which it was filtered using Whatman No. 1 filter paper. The filtrate was concentrated by heating in a water bath at 40 ◦C and the remaining solvent was removed in a rotary evaporator to produce crude ethanolic extract of C. odorata.

Animal Housing

Twenty-five albino rats weighing between 150g+ 2.6-317g+ 3.5 were used for this study. These rats were obtained from the animal housing of the Pharmacology Department of Niger Delta University, Bayelsa State, Nigeria. They are housed under standard condition of temperature (27- 20^0C) with twelve hours light and dark periodicity. These animals were housed in clean gaitzed in groups and fed on standard feed pellets (Guinea feed Nigeria Plc) and clean water ad libitum throughout the duration of the study. The rats were kept for environmental adaptation for two weeks. Animals were handled in the study according to institutions guidelines for experiments involving the use of animals.

Experimental Design

The rats were weighed and divided into five group. The duration of this study was for a month, the animals were allowed to acclimatize for two weeks. After the acclimatization period 25 rats were randomly divided into 5 groups with

each group containing 5 rats per group (A-E). Group A rats (control) were administered orally with pelleted growers feed (mash) and water throughout the experiment.

Group B rats (Positive control) rats were intraperitoneally injected with Lead poison only (150ml/100mg) and given growers feed (mash) and water for 2 days.

Group C were injected intraperitoneally with lead poison (150ml/100mg) for 2 days, and then the extract was administered orally 800mg/kg body weight, pelleted growers feed (mash) throughout the experiment for 30 days.

Group D rats were administered orally with Chromolaena Odorata Extract (400mg/kg) for 30 days and injected intraperitoneally with lead (150ml/100kg) for 2 days and they were given growers pellet feed (mash) and water throughout.

Group E rats were administered orally with Chromolaena Odorata Extract and growers pellet feed (mash) and water for 14 days.

Table 1: Study group of the experimental Rats

Group A	Group B	Group C	Group D	Group E
5 Food and water only	5 Lead (150mg/kg) +Food a nd water	5 Lead(150mg/kg) + *Chromolaena Odorata* Extract (800mg/kg) +feed and water.	5 Lead(150kg/mg) + *Chromolaena Odorata* Extract (400mg/kg) + feed and water.	5 *Chromolaena Odorata* Extract (800mg/kg) + feed and water

Study duration

The study lasted between November, 2021 to December, 2021. It took a period of four weeks, two weeks for environmental adaptaion and two weeks substance administration.

Route of administration

Lead was administered intraperitoneally. Siam leaf (Chromolaena Odorata) extract was administered orally using orogastric tube

Sample collection

Upon completion of the weeks of substance administration, the animals were sacrificed by administering chloroform as anaesthetic substance. The rats were dissected to harvest the liver which was fixed immediately with 10% formalin.

Tissue processing

The tissues were being processed according Histological standard tissue processing, embedded, sectioned and stained using Haematoxylin and Eosin staining procedure at the Histopathology laboratory of Niger Delta Teaching Hospital (NDUTH) Okolobiri.

Staining Protocol

Sections were de-waxed in 2 changes of xylene until all the wax was removed and sections were hydrated in descending grades of alcohol starting from absolute, 80% alcohol, 70% alcohol, 50% alcohol and finally water. Sections were stained with Harris Hematoxylin for 15 minutes and the sections were rinsed in water. Tissue sections were differentiated in 1% acid alcohol until the nucleus retains the stain then the sections were blued in Scot tap water for 2 minutes and Counterstaining was done using Eosin for 2 minutes. Sections were dehydrated in ascending grades of alcohol (50%, 70% 80% and absolute alcohol) and were clear and mounted using a DPX and viewed using a microscope.

Microscopic description of Histo-photomicrographs and plates

Plate 1 Reveals the morphology of the heart after the administration of the various treatments for 60 days. Slide shows normal morphology of the hearth muscles, the transverse section (T), oblique section (Q, the central nuclei (arrow) (X40) H &E staining technique.

Plate 2 Reveals the morphology of the heart after the administration of the various treatments for 14 days. Slide shows degeneration of transverse muscles (D), vascular congestion (V) (X10) (X40) H &E staining technique.

Plate 3 Reveals the morphology of the heart after the administration of the various treatments for 14 days. Slide shows degeneration of transverse muscles(D), vascular congestion (V) with areas of necrosis(N)(X10) (X40) H &E staining technique.

Plate 4 Reveals the morphology of the heart after the administration of the various treatments for 14 days. Slide shows degeneration of transverse muscles (D) with areas of necrosis (N) and congestion of blood vessels (X10) (X40) H &E staining technique.

Plate 5 Reveals the morphology of the heart after the administration of the various treatments for 60 days. Slide shows normal morphology of the heart muscles, the transverse section(T), oblique section (Q, the central nuclei (N) (X40) H &E staining technique.

Plate 6 Reveals the morphology of the lung after the administration of the various treatments for 14 days. Slide shows normal morphology of the lung, the alveolar sac (A), alveolar duct (D) the alveoli (A) and interalveolar septa(arrow) (X40) H &E staining technique.

Plate 7 shows the morphology of the lung after the administration of the various treatments for 14 days. Slide shows enlargement of the alveoli, thickening of interalveolar septa with presence of inflammatory cells(I), degeneration of the epithelium of the bronchus (arrow)with edema (E) (X10) (X40) H &E staining technique.

Plate 8 shows the morphology of the lung after the administration of the various treatments for 14 days. Slide shows enlargement of the alveoli, thickening of interalveolar septa(E) with presence of inflammatory cells(I) (X10) (X40) H &E staining technique.

Plate 9 shows the morphology of the lung after the administration of the various treatments for 14 days. Slide shows, thickening of interalveolar septa(E) necrosis of the alveoli (N), with presence of inflammatory cells(I) (X10) (X40) H &E staining technique.

Plate 10 shows the morphology of the lung after the administration of the various treatments for 14 days. Slide shows normal morphology of the lung, the alveolar sac (A), alveolar duct (D) the alveoli (A) and interalveolar septa(arrow) (X40) H &E staining technique.

Plate 1

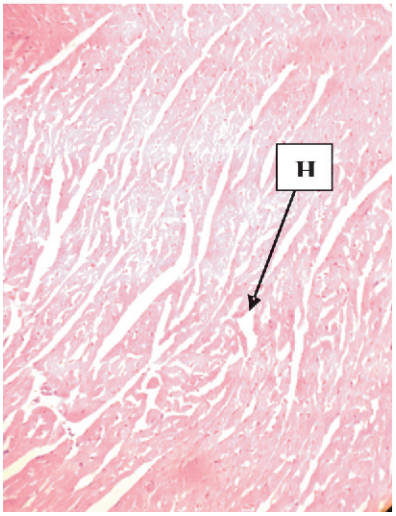
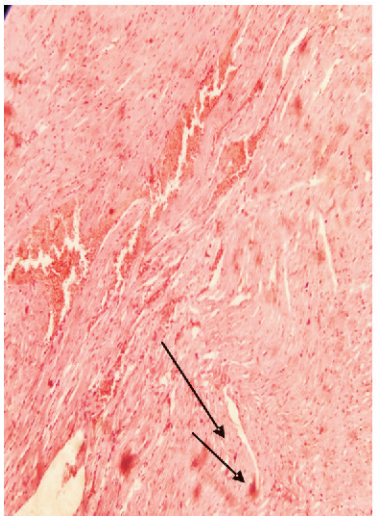


Plate 2



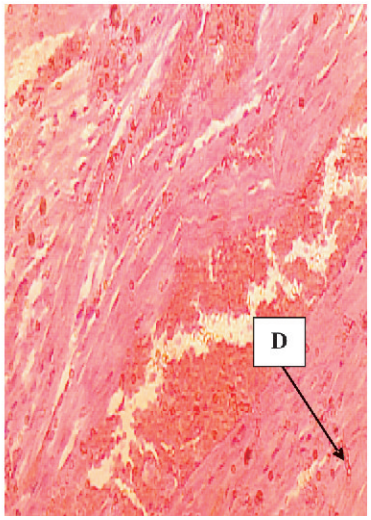


Plate 3

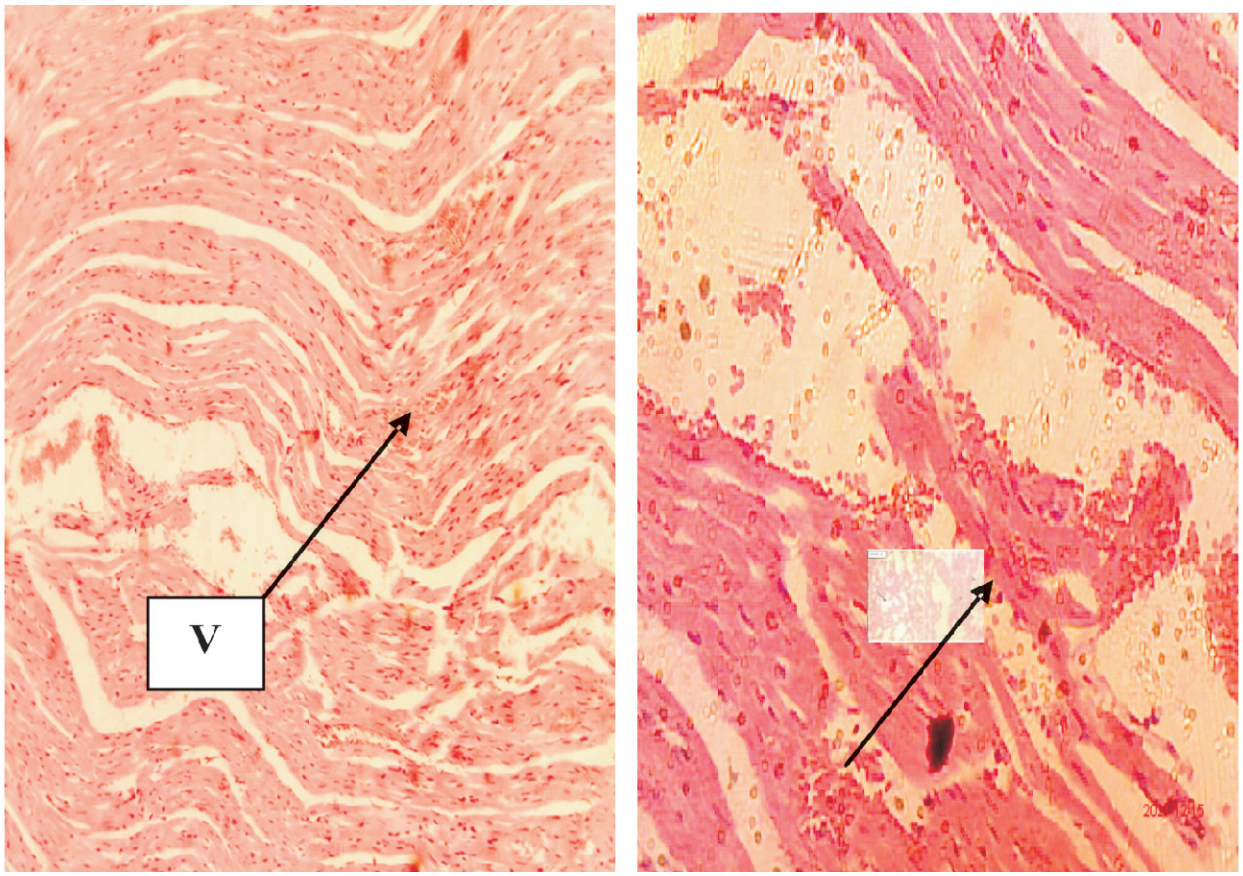


Plate 4

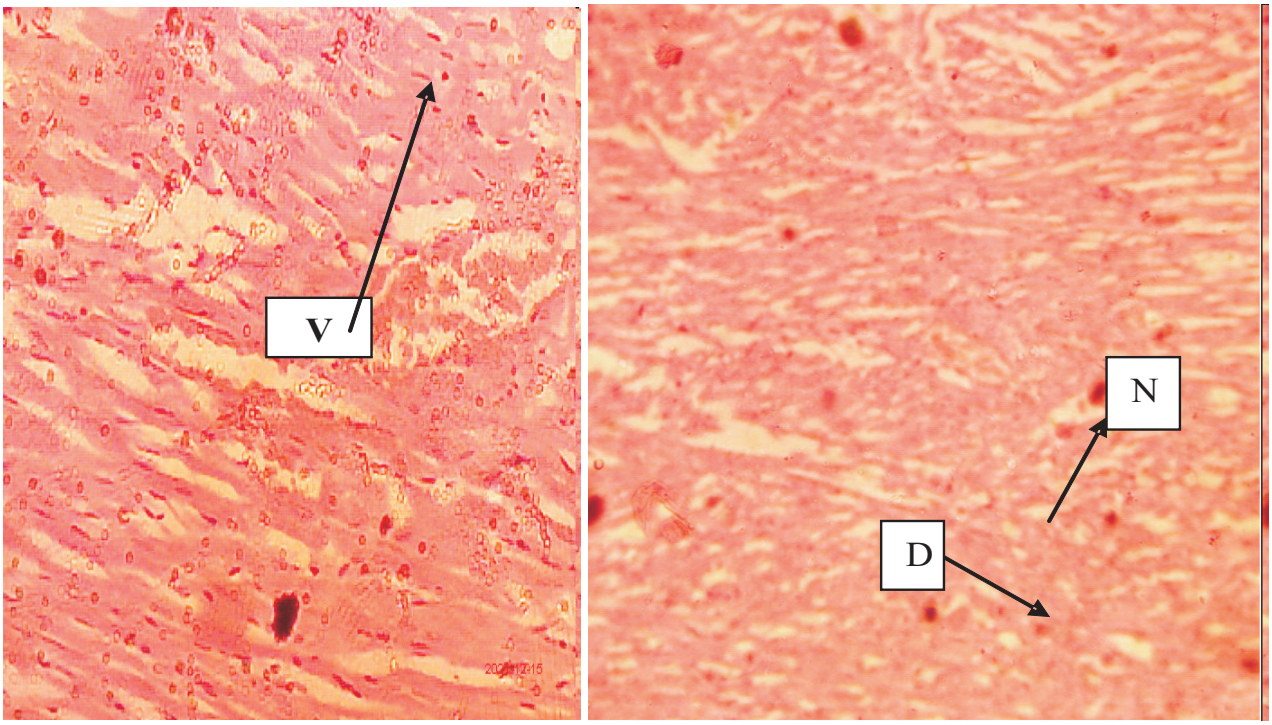


Plate 4

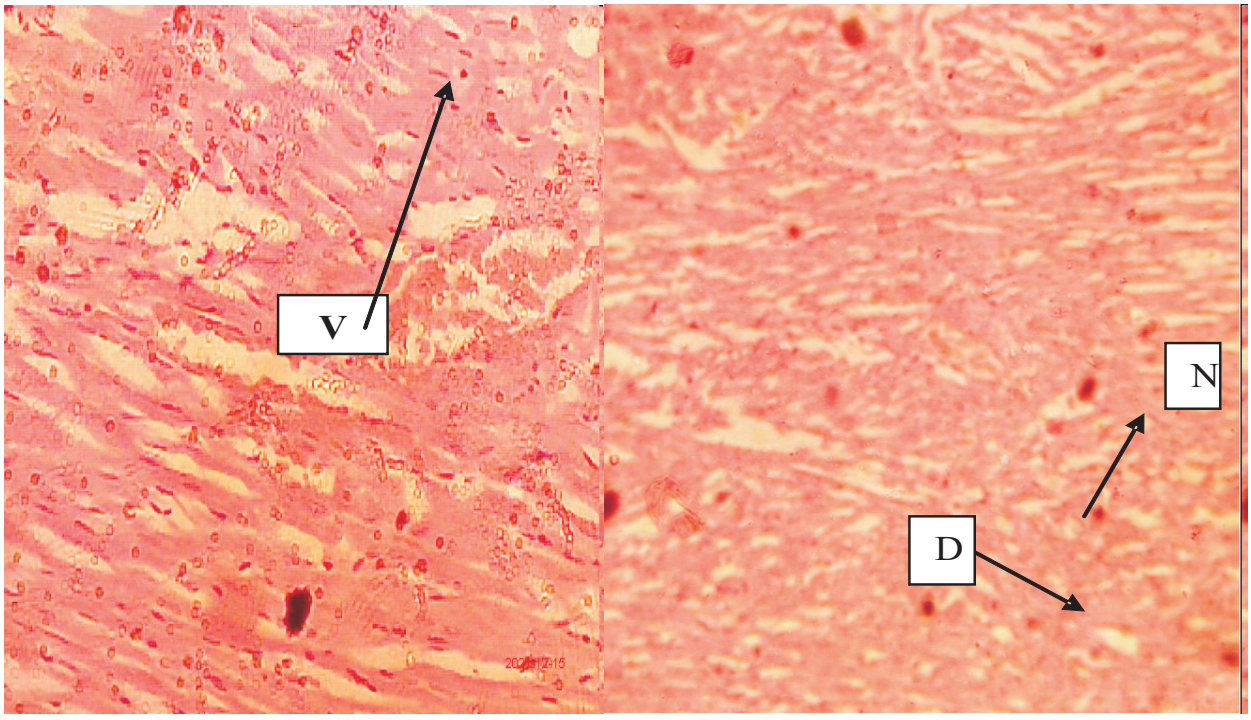


Plate 5

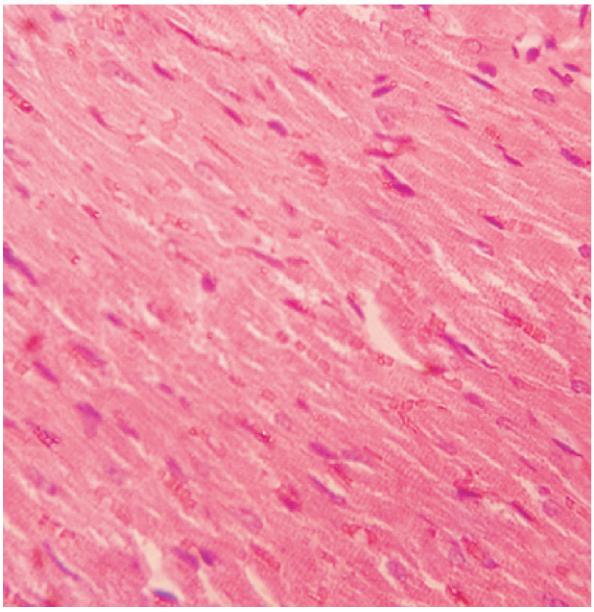


Plate 6

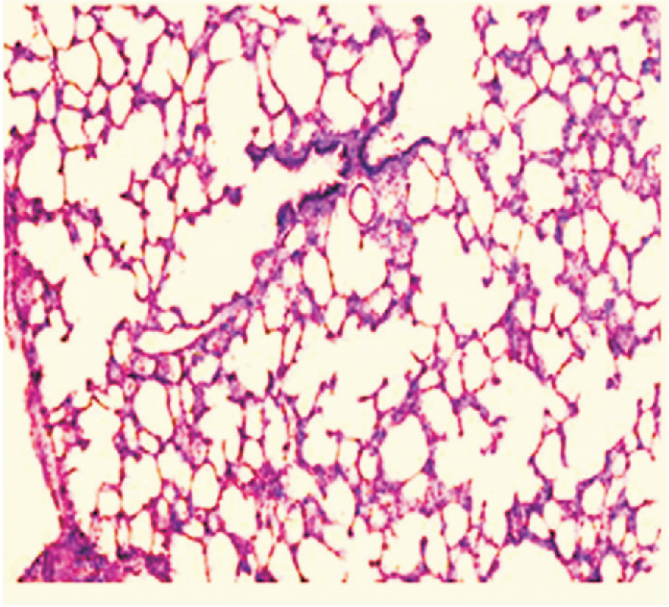


Plate 7

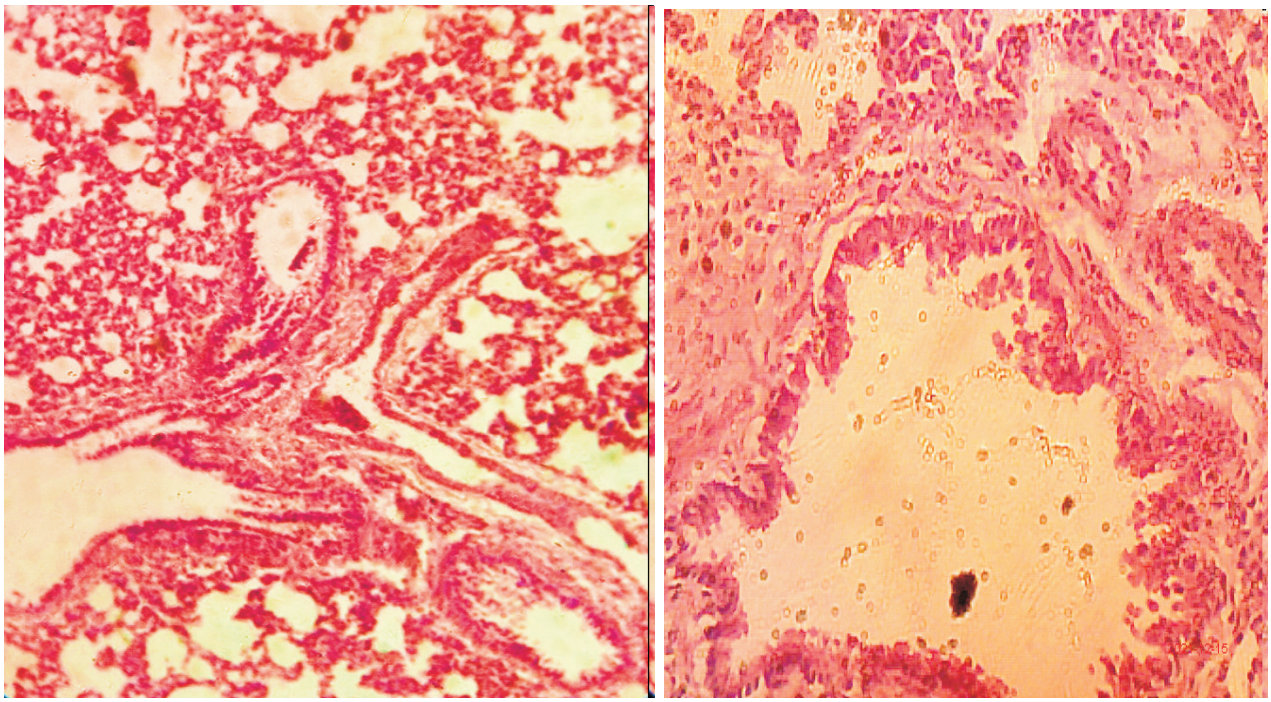


Plate 8

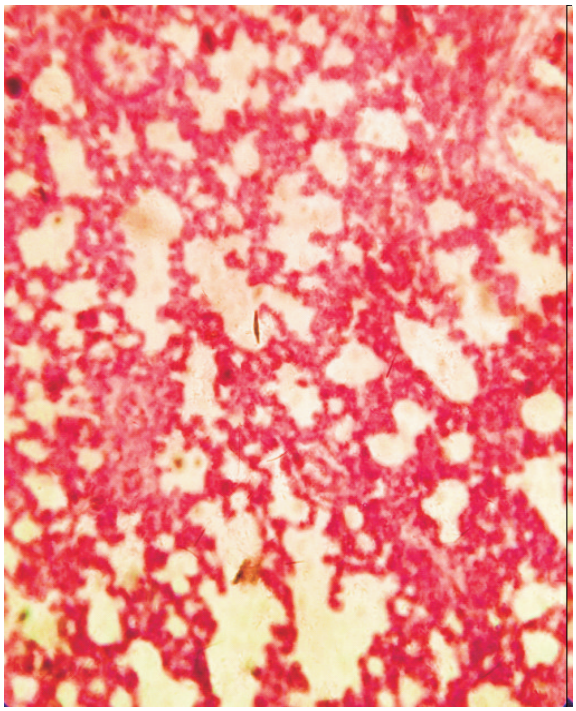


Plate 9

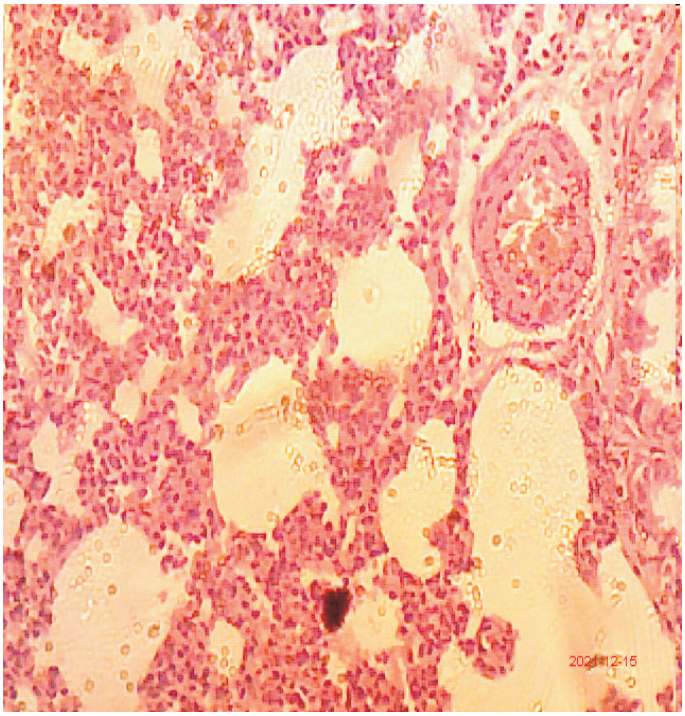
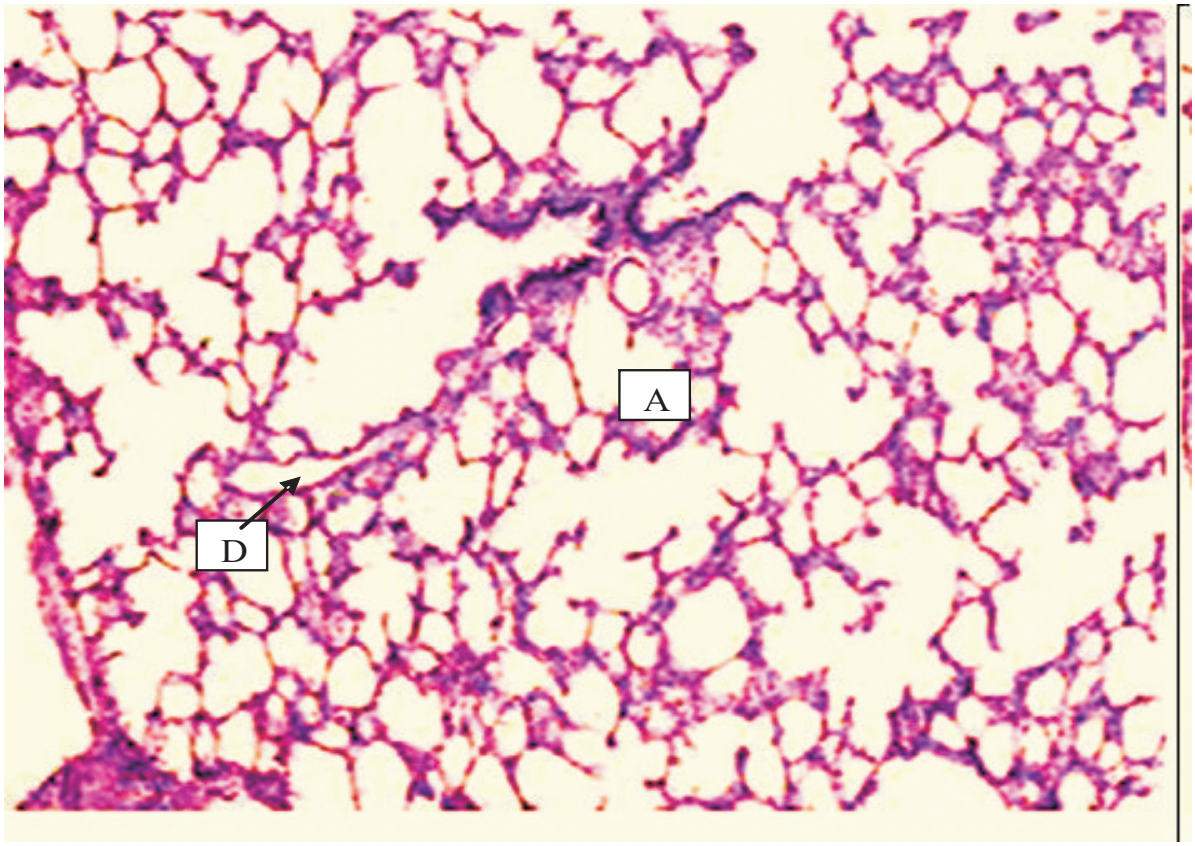


Plate 10



Tabular description for group A.

Table 2: Shows the mean and standard deviation of the initial and final weight for Group A.

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Initial weight	5	9.50	118.00	86.8400	44.20569
Final weight	5	102.50	136.80	116.7400	14.21489
Valid N (listwise)	5				

Tabular description for group B.

Table 3: Shows the mean and standard deviation of the initial and final weight for Group B.

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Initial weight	5	140.50	150.30	144.4800	3.66565
Final weight	5	98.20	133.00	110.2400	13.98617
Valid N (listwise)	5				

Tabular description for group C.

Table 4: Shows the mean and stand ard deviation of the initial and final weight for Group C.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Initial weight	4	118.00	123.00	121.0000	2.16025
Final weight	4	110.70	127.00	116.9250	7.43118
Valid N (listwise/)	4				

Tabular description for group D.

Table 5: Shows the mean and standard deviation of the init ial and final weight for Group D.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Initial weight	4	120.00	133.00	124.5000	5.80230
Final weight	4	74.00	117.60	95.1250	22.26318
Valid N (listwise)	4				

Tabular description for group E.

Table 6: Shows the mean and standard deviation of the initial and final weight for Group E.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Initial weight	5	105.00	118.00	111.7800	5.48197
Final weight	5	99.80	133.40	110.3800	13.93797
Valid N (listwise)	5				

Tabular Description for all groups

Table 7: Shows the Descriptive statistics for all Groups detailing the mean and standard deviation.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Initial weight	23	9.50	150.30	117.2826	27.67737
Final weight	23	74.00	136.80	110.2174	15.55684
Valid N (listwise)	23				

Table 8 Shows a total summary of all Groups detai ling the values and difference of the initial and final weight of various Groups.

Variables	t	P- value	Decision	
Group A &B initial	-2.906	0.020	Reject null hypo	Difference
Group A &B final	0.729	0.487	Accept null hypo	No difference
Group A &C initial	-1.523	0.172	Accept null hypo	No difference
Group A &C final	-0.023	0.982	Accept null hypo	No difference
Group A &D initial	-1.659	0.139	Accept null hypo	No difference
Group A &D final	1.779	0.118	Accept null hypo	No difference
Group A &E initial	-1.252	0.246	Accept null hypo	No Difference
Group A &E final	0.714	0.495	Accept null hypo	No Difference
Group B &C initial	11.251	0.000	Reject null hypo	Difference
Group B &C final	-0.856	0.420	Accept null hypo	No Difference
Group B &D initial	6.335	0.000	Reject null hypo	Difference
Group B &D final	1.251	0.251	Accept null hypo	No Difference
Group B &E initial	11.088	0.000	Reject null hypo	Difference
Group B &E final	-0.016	0.988	Accept null hypo	No Difference
Group C &D initial	-1.131	0.301	Accept null hypo	No Difference
Group C &D final	1.858	0.113	Accept null hypo	No Difference
Group C &E initial	3.139	0.016	Reject null hypo	Difference
Group C &E final	0.841	0.428	Accept null hypo	No Difference
Group D &E initial	3.373	0.012	Reject null hypo	Difference
Group D &E final	-1.264	0.247	Accept null hypo	No difference

Discussion

The Plate labelled 4.1 to 4.5 shows the morphology of the heart after staining with Haematoxylin and Eosin and viewed at 400X magnification. The plates labelled 4:1 to 4.5 shows the morphology of the liver after the administration of the various treatments for 14 days. The slide labelled group A represents the animals in the control group which were given feed and water only. Those labelled group B are those to which lead was administered (0.6mg/kg), feed and water, the group labelled C were the animals given the extract (Chromolaena Odorata) (0.6mg/kg) lead(0.6mg/kg), feed and water. The group labelled D represent animals which were administered with a low dose of aqueous Extract (0.5mg/kg). lead (0.6mg/kg), feed and water. Lastly the slide labeled E represents animals which were feed Chromolaena Odorata (0.9mg/kg).

Plate 1 represent animal in group A. Sections showed normal slides with transverse section, oblique section and the central nuclei Plate 1 was used to represent the control group A. There was no histological alteration to section because the control group was just fed with water and grower's pellet for 21 without administration of Lead and aqueous Extract of Chromolaena Odorata.

Plate 2 slide shows degeneration of the transverse muscle, vascular congestion. Plate 2 was used to represent group B which was the positive control group which were given Lead 0.6mg/kg. There were visible histological presentation of enlargement of the transverse muscles and vascular congestion. Which might be as a result of the lead that was administered which is in conjunction to the work done by (Hwang *et al*., 2001) and his result showed

presence of Necrosis and large degeneration of the heart muscles.

Plate 3 slide shows degeneration of transverse muscles with area of Necrosis and congestion of blood vessels. Plate 3 was used to represent group C which was the group that was administered with Lead intraperitoneally and using an oral gavage tube a high dose of aqueous Extract of Chromolaena Odorata was also administered orally. This plate shows enlargement of transverse muscles and multiple vascular congestion. It was observed also that the administration of the extract had no effect on the presence of Lead because there were visible degeneration of organs and tissues which is in conjunction with a previous report (Enosakhare *et al*., 2018).

Plate 4 slide shows degeneration of transverse muscles(D) with areas of necrosis(N) and congestion of blood vessels. Plate 4 was used to represent the group D which was administered with Lead and a low dose of the aqueous Extract of Chromolaena Odorata. This group showed muscular degeneration and necrosis. The administration of the Extract also had no effect on the Presence of Lead which may be as a result of the low dose being administered in conjunction with "Evaluation of hepatotoxicity with ethanolic Extract of Chromolaena Odorata" (Imebong *et al*., 2018).

Plate 5 slide shows normal morphology of the Shows the Morphology of the heart after the administration of the various treatments for 14 days. Slide shows normal morphology of the hearth muscles, the transverse section(T), oblique section (Q), the central nuclei (N). Plate 5 was used to represent group E which was administered with only a high dose of aqueous Extract of Chromolaena Odorata. The plate showed a normal histology of the Muscle and central nuclei which may be as a result of the dose administered which is in conjunction with "Cardiovascular effect of Chromolaena Odorata on adult albino wistar rat" as previously reported (Asomugha *et al*., 2014).

The various photomicrograph of the heart sections in the various plates agree however with the study carried out by; Omobowal *et al*. (2014). According to their study, lead caused a significant increase in blood lead level (BILL) and serum malondialdehyde (MDA) concentration in rats treated with lead alone as compared to the normal control and this result may be caused by effect of lead on heart structure. They showed that oxidative stress is an important mechanism of Lead-induced toxicity, imbalance and removal of reactive oxygen species in cellular structure causing damage to membrane. membrane lipid and protein (Ahmed *et al.,* 2010; Aziz *et al*., 2012).

Our finding is in agreement with previous reports (Kalia and Flora, 2005; Reddy *et al*., 2004) which shows that exposure to lead causes immunotoxicity and toxicity to organs, excessive intake of lead has been linked with cancer of the stomach, small intestine, large intestine, ovary, kidney, liver, lungs etc.

Group C and D had no significant change in their values as compared to the control group ($p>0.05$). Group E also had no significant difference or increase in the values ($p>0.05$).

The only significant difference seen was in their initial and final weight. A significant difference ($p>0.05$) was seen in the initial weight as compared to their final weight. For group B (Lead only) there was an increase in the weights of the animals after administration, which is indicative for a giving them pseudo-weight. For groups C and D (leaf extract and Lead), it shows that the leaf extract had no effect on the Lead poison as the organs of the animals were inflamed as seen in the plates above.

Ingestion, thallation and dermal exposure of Lead induces increase in respiratory disease and alteration of histological characterization in the cardiovascular tissues due to Pb in toxication, (Jarrar *et al*., 2011; Al Naimi *et al*., 2011).

The various photomicrograph of the Heart sections in the various plates agrees with the study carried out by Repetto et al. (2010). Similarly, Omobowal *et al*. (2014) in their study observed that exposure to lead caused a significant increase in blood lead level (BILL)

and serum malondialdehyde (MDA) concentration in rats treated with lead alone as compared to the normal control and this result may be caused by effect of lead on heart structure damaged of hepatocyte and disturbance in heart rate. They showed that oxidative stress is an important mechanism of lead-induced toxicity, imbalance and removal of reactive oxygen species in cellular structure causing damage to membrane, membrane lipid and protein (Ahmed *et al*., 2010; Aziz *et al*., 2012).

Our finding is also in agreement with previous reports (Kalia and Flora, 2005; Reddy *et al*., 2004) showing that exposure to lead causes immunotoxicity and toxicity to organs, excessive intake of lead has been linked with cancer of the stomach, small intestine, large intestine, ovary, kidney, liver, lungs etc.

The only significant difference seen was in their initial and final weight, a significant difference ($p>0.05$) was seen in the initial weight as compared to their final weight. For group B (lead only) there was an increase in the weights of the animals after administration, which is indicative for an inflamed heart, giving them pseudo-weight. For groups C and D (leaf extract and lead), it shows that the leaf extract had no effect on the lead poison as the organs of the animals were inflamed as seen in the plates above.

Ingestion, thallation and dermal exposure of lead induces increase in hepatic peroxidation and alteration of histological characterization in the hepatic tissues due to Pb in toxication (Jarrar *et al*., 2011; Al Naimi *et al*., 2011).

Discussion for Lungs

The Plate labelled 4.1 to 4.5 shows the morphology of the liver after staining with hematoxylin and eosin and viewed at 400X magnification. The plates labelled 4:1 to 4.5 show the morphology of the lung after the administration of the various treatments for 21 day. The slide labelled group A represents the animals in the control group which were given feed and water only. Those labelled group B are those to which Lead was administered (0.6mg/kg), feed and water, the group labelled C were the animals given the extract (Chromolaena Odorata) (0.6mg/kg) Lead (I mg/kg), feed and water. The group labelled D represent animals which with lead (0.5mg/kg), feed and water. Lastly the slide labeled E represents animals which were feed Chromolaena Odorata (0.9mg/kg).

Plate 6 represent animal in group A. Sections showed normal slides with Alveolar sac, Alveolar duct and alveoli and intra alveolar septa. Plate 6 was used to represent the control group A. There was no histological alteration to section because the control group was just fed with water and grower's pellet for 21 without administration of Lead and aqueous Extract of Chromolaena Odorata.

Plate 7 slide shows enlargement of the alveoli, thickening of intra alveolar septa with presence of inflammatory cells. Plate 7 was used to represent group B which was the positive control group which were given Lead 0.6mg/kg. There were visible histological presentations of enlargement of the Alveoli, thickening of intra alveolar septa with presence of inflammatory cells. This might be as a result of the lead that was administered which is in conjunction to the work done by (Wang et al., 2001) and his result showed presence of Necrosis and large degeneration of the Alveoli duct.

Plate 8 slide shows enlargement of the alveoli, thickening of the intra alveolar septa with presence of inflammatory cells. Plate 8 was used to represent group C which was the group that was administered with Lead intraperitoneally and using an oral gavage tube a high dose of aqueous Extract of Chromolaena Odorata was also administered orally. This plate shows enlargement of the alveoli, thickening of the intra alveolar septa with presence of inflammatory cells marked by presence of Kupffer cells. It was observed also that the administration of the extract had no effect on the presence of Lead because there were visible degeneration of organs and tissues which is in agreement with a previous report (Hussein *et al*., 2011).

Plate 9 slide shows thickening of the intra alveolar septa, necrosis of the alveoli with inflammatory cells. Plate 9 was used to represent the group D

which was administered with Lead and a low dose of the aqueous Extract of Chromolaena Odorata. This group showed thickening of the intra alveolar septa, Necrosis of the Alveoli which is marked with inflammatory cells and presence of Kupffer cells. The administration of the Extract also had no effect on the Presence of Lead which may be as a result of the low dose being administered in conjunction with a work done by (Kouame *et al*., 2013).

Plate 10 slide shows normal morphology of the Alveoli, intra alveolar septa. Plate 10 was used to represent group E which was administered with only a high dose of aqueous Extract of Chromolaena Odorata. The plate showed a normal histology of the Alveoli, intra alveolar septa which may be as a result of the dose administered which is in conjunction with previous report (Phan *et al*., 2001).

The various photomicrograph of the lung sections in the various plates agree however with the previous studies carried out, lead caused a significant increase in blood lead level (BILL) and serum malondialdehyde (MDA) concentration in rats treated with lead alone as compared to the normal control and this result may be caused by effect of lead on lung structure. They showed that oxidative stress is an important mechanism of Lead-induced toxicity, imbalance and removal of reactive oxygen species in cellular structure causing damage to membrane. membrane lipid and protein (Ahmad *et al*. 2010; Assi *et al*., 2016).

Our finding is in agreement with a previous report (Phan *et al.*, 2001) which indicated that exposure to lead causes immunotoxicity and toxicity to organs, excessive intake of lead has been linked with cancer of the stomach, small intestine, large intestine, ovary, kidney, liver, lungs etc.

Group C and D had no significant change in their values as compared to the control group ($p>0.05$). Group E also had no significant difference or increase in the values ($p>0.05$).

The only significant difference seen was in their initial and final weight, a significant difference ($p<0.05$) was seen in the initial weight as compared to their final weight. For group B (Lead only) there was an increase in the weights of the animals after administration, which is indicative for a giving them pseudo-weight. For groups C and D (leaf extract and Lead), it shows that the leaf extract had no effect on the Lead poison as the organs of the animals were inflamed as seen in the plates above.

Ingestion, thallation and dermal exposure of Lead induces increase in respiratory disease and alteration of histological characterization in the respiratory tissues due to Pb in toxication (Umukoro *et al*., 2006).

Conclusion

This study shows that the oral administration of Lead for the period of 21days lead to the presence of inflammatory cells, enlargement of the Alveoli, intra alveolar septa, Necrosis of the alveoli. It was also observed that the oral administration of Chromolaena Odorata at various doses, both a high dose (800mg/kg) and a low dose of (400mg/kg). It had no effect on the normal histology of the lungs. Further study should be carried out extending the duration of study and increasing the dosage of the extract given to observe if it can ameliorate the effect of lead poison.

Recommendation

Further study on lead toxicity on various organs should be carried out and detailed study on the effect of *Chromolaena Odorata* on biological parameters and its anti-toxic effect on lead poison. Further study on the effect on *Chromolaena Odorata* on lead using higher dose should be carried out.

This study is meant to determine the effect of Lead toxicity to the heart and lungs of albino wistar rats and also to determine the histological effect of Chromolaena Odorata Extract on lead induced toxicity on the Heart and Lungs of albino wistar rats.

Declaration of Competing Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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