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Comparative study on serum biochemical effects of *datura metel* seeds extract and lidocaine hydrochloride anaesthetic in West African dwarf buck goats that underwent orchidectomy

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Abstract
This study compares the serum biochemical effects of *Datura metel* seed extract and lidocaine hydrochloride as anesthetic agents in West African Dwarf buck goats undergoing orchidectomy. Castration is a common practice in goat husbandry aimed at reducing aggressive behavior, improving meat quality, and preventing undesired mating. The study evaluates the impact of these anesthetic agents on key biochemical parameters, including liver and kidney function markers, to assess their safety and efficacy. Findings indicate significant differences in serum biochemical responses between the two anesthetic agents, with *Datura metel* showing potential anesthetic properties but also raising concerns regarding its effects on organ function. This research provides valuable insights into alternative anesthetic options for small ruminant surgery in resource-limited settings.

Keywords: Castration, datura metel, lidocaine hydrochloride, serum biochemistry, West African dwarf goat, anesthesia, orchidectomy

1. Introduction
Castration, is a common practice in goat husbandry worldwide, involves the removal or destruction of the testes, epididymis, and a portion of each spermatic cord, rendering the testis nonfunctional in situ (Schmid *et al.*, 2021), with the primary objectives of reducing aggressive behavior, improving meat quality and preventing unwanted mating, mounting activities, and injuries related to testicular or inguinal diseases [1].

Anaesthetics comprise a class of drugs that temporarily eliminate sensory perception by acting on the nervous system, either locally or systemically. Anaesthesia, a reversible state, is characterized by the loss of sensitivity to pain, achieved through the administration of drugs or other physical agents [2].

Veterinary anaesthesia is divided into three major groups (general regional and local anaesthesia); general anaesthesia induces complete unconsciousness, regional anesthesia causes insensitivity to larger but limited body area, some methods of producing regional anaesthesia includes; paravertebral anaesthesia, nerve block to the limb, mammary ring block [3]while local anaesthesia is lost of sensation to a small body area[4] and some basic methods of inducing local anaesthesia are; topical or surface anaesthesia, infiltration anaesthesia, intrasynovial anaesthesia and spinal anaesthesia.

Anaesthetic agents are used to permit easy handling, obstertrical manipulation and surgical procedures on animals with minimal pain, movement and vocalisation during surgery [2, 5]

Several features of local anesthesia rendered it particularly useful in veterinary practice and many surgical procedures can be carried out satisfactorily under local anaesthesia [2, 4]. In some animals, sedation is often employed to facilitate cooperation from animals by reducing fear and anxiety [3]. The sedation also reduces the likelihood of sudden movement in animals. Local anaesthetic techniques are not difficult to learn and do not involve the use of expensive or complicated equipment most especially in goats [6, 7].

Local anaesthetics play a crucial role in veterinary medicine, particularly in diagnosing and managing pain. In animals, nerve blocks are employed to identify the source of lameness [8].

Furthermore, local anaesthetic solutions are utilized to facilitate painless surgical procedures, such as castration and mammary surgery. Techniques like subcutaneous testicular infiltration, ring block, and inverted "V" block enable veterinarians to perform examinations, reduce stress, and provide effective intra-operative and post-operative analgesia [9].

In Veterinary Clinical Practice, goats are not stoic animals generally because they have very low pain threshold [2]. These animals however tolerate few surgical procedures without the use of general or local anaesthesia [10]. General anaesthesia in goats just like in other large animals are associated with a lot of side effects like depression of central nervous system, aspiration pneumonia, passive regurgitation, excessive salivation as well as ruminal tympany [2].

Datura metel (Devil's trumpet, Thorn-apple) belonging to the family Solanaceae is a Nigerian medicinal plant that is known in Tiv; zakami/hiron Hausa; zakami, Idoma; gege, Igede; ima-ala and Etulo as efue me-ede [11]. It is widely used in different ways. The fruits and seeds have several uses; the spiny fruit is used to card cotton and the calyx base is used in rubbing teeth and in phytomedicine to cure diseases. Other species of Datura in Africa include *D. Stramonium*, *D. Metalodes* and *D. Suaveolens*. [12]. In medical use, the distinction between them is not considered because they all yield the same pharmacologically important tropane, hysoscine, atropine and hypocyanine [13, 14]. The leaves and seeds are widely used in herbal medicine as anaesthetic, antispasmodic, bronchodilator and as hallucinogenic effect [15]. It is popular all over the world for its medicinal uses like its use in fever with catarrh, cerebral complications, diarrhoea, skin diseases, antiseptic, animal bites, antihelminthic, antimicrobial and in herpatic diseases, and also has healing potential on burn wounds and anaesthetic/sedative properties [16, 17, 18, 19]. It is also known for its antibacterial activity against burn pathogens and antifungal activity against phytopathogens [21, 22]

Recent research has explored the effects of *Datura metel* seed extract on anesthesia. A study conducted by Umayange *et al*., [5] found out that *Datura metel* seed extract has local anesthetic potential in West African Dwarf Buck Goats, although its efficacy and duration were lower compared to lidocaine, suggesting its suitability for minor surgical procedures.

A study conducted on rabbits revealed that the seed extract significantly influenced the duration of amylobarbitone anesthesia [23]., Assessment study of local Anaesthetics efficacy of the crude extract of Sterculia tragacantha using West African Dwarf Goats [19]. Wang *et al*,[22] conducted an Invivo anti-inflammatory and analgesic activities of a purified saponin fraction derived from the root of *Ilex pubescens* and Local anesthetic and tissue effects of the leaf extract and fractions of *Sterculia tragacantha* Lindl [19].

The indigenous use of medicinal plants in the treatment of diseases and ailments especially in developing countries appear to be on the increased. From the prehistoric period, the use of herbal anaesthesia was introduced. The use of opium-like preparations in anesthesia was recorded in the Ebers Papyrus of 1500BC. Opium was introduced in India in 330 BC and China in 600BC. In India, Sushrutu Samhita advocated for the use of wine with cannabis incense for aneasthesia in the 3rd Century [24, 25, 26].

local anaesthetics are essential in veterinary practice to minimize pain and discomfort in animals. The most frequently used local anaesthetics in veterinary medicine are lidocaine, bupivacaine, and mepivacaine. Lidocaine is particularly popular and well-tolerated in goats and sheep [27]. One of the significant advantages of using lidocaine is its ability to mitigate the neuroendocrine and behavioural changes associated with orchidectomy, such as decreased activity, inappetence, and abnormal vocalization [28].

1.1 Aim of the study

The main aim of the study is to Compare the serum biochemical effects of Datura metel seed extracts and lidocaine hydrochloride local anaesthetics effects in West African dwarf buck goats that were castrated.

1.2 Hypothesis

- **Null hypothesis:** The *Datura metel* seed extracts and lidocaine hydrochloride local anaesthetics is a local anaesthetic agent that does not have effects on biochemical parameters in West African dwarf goats
- **Alternate hypothesis:** The *Datura metel* seed extracts and lidocaine hydrochloride local anaesthetics are local anaesthetic agent that have effects on biochemical parameters in West African dwarf goats

2. Materials and Methods

2.1 Experimental Site, Animals, Housing, Acclimatization and feeding

This study utilized twenty adult West African Dwarf Buck Goats, aged 6 months to 2 years and weighing 12-35 kg, which were randomly divided into two groups of ten: a lidocaine group and an extract group. The animals were housed in large animal cubicles at the Veterinary Teaching Hospital, University of Agriculture, Makurdi, where they were fed a diet consisting of grasses, yam peels, and commercial ruminant feed, supplemented (Hybrid Feeds Limited) produced in Kaduna, Nigeria. with potable water *ad libitum*. Following a one-week acclimatization period, the experiment commenced.

2.2 Evaluation of Lethal Dose

The lethal dose of *Datura Metel* L seed extract was evaluated using the up-and-down method [29]. The extract showed no toxic effects or mortality in albino rats at doses of 10, 100, and 1, 000 mg/kg in the initial phase, and similarly, no adverse effects were observed at higher doses of 1, 500, 2, 500, and 4, 000 mg/kg in the second phase, indicating a relatively low acute toxicity profile.

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2.3 Preparation of Plant Seeds Extract

One kilogram of *Datura metel* seeds was obtained from dried fruits and dried further in the laboratory at room temperature until a constant weight was achieved. The dried seeds were then pulverized into a fine powder using a mortar and pestle. Fifty grams of the powdered seeds were subjected to serial extraction with 1000 milliliters of water

in an extraction apparatus over a 48-hour period, during which the mixture was intermittently shaken.

The preparation of Datura Metel ethanol seed extract for intramuscular injection involves extracting the seeds with 95% ethanol using a Soxhlet apparatus, followed by filtration through a 0.22 µm filter paper (Millipore, USA) and then through a syringe filter (Pall Corporation, USA; Acrodisc 0.22 µm) to ensure sterility. The resulting extract is then diluted with saline or water for injection, pH-adjusted when necessary, using hydrochloric acid or sodium hydroxide solutions, and filled into sterile vials.

2.4 Experimental Procedure

The study involved two groups of West African Dwarf (WAD) Buck Goats. Group A received subcutaneous infiltration of *Datura metel* seed extract at a dose of 75mg/kg body weight, while Group B was treated with lidocaine hydrochloride at a dose of 4mg/kg body weight. Prior to administration, the scrotal region of both groups was shaved and prepared aseptically. A 1.5-inch, 18-gauge needle was inserted into the skin at an angle of approximately 20 degrees, and 0.5ml of the extract or lidocaine was deposited, raising a wheal.

Following local anesthesia establishment, as confirmed by negative twitch response, bilateral open orchidectomy was performed. The goats were restrained in lateral recumbency, and the scrotum was shaved and scrubbed with 70% alcohol. An incision was made parallel to the median raphe, and the testicles were removed after ligating the spermatic cord with chromic catgut. The scrotal incision was left to heal as an open wound.

2.5 Evaluation of local anaesthetic effects of *Datura metel* extract following epidural injection for orchidectomy

Ten (10) goats (WAD) were used for this study. The animals weighed between 15- 30 kilograms. The skin around the vertebral column at the ileocecal junction and round the scrotal sacs of each goat were shaved from T13 to the middle of the tails. The shaved area was aseptically prepared by cleaning with 70% alcohol. The animals were separated into two groups of five animals each, group A was treated with extract while Group B was treated with lidocaine. The *D. metel* extract was administered at the dose of 75mg/kg body weight in to the epidural space at the lumbosacral junction (plate3; figure1), while lidocaine was given at the same route and at the dose of 4mg/kg body weight

Five millitres of blood samples were obtained by jugular venopuncture using heparinised tubes before and after administration of the extract and drug. The blood samples were obtained at 0, 60, 120, 240 and 480 minutes after dosing.

The two- and -half (2.5) millitres of the blood was centrifuge at 3000 revolutions per minutes (rpm) for 5 minutes, to obtain plasma which was used for the determination of biochemical parameters (Total protein, albumin, total bilirubin, blood urea nitrogen, creatinine, alanine aminotransferase (ALT), asperate aminotransferase (AST), potassium (K), sodium (Na), and Chlorine (C) ions.

The biochemical parameters were determined using biochemical kits. at the Veterinary Teaching Hospital, University of Agriculture, Makurdi.

2.6 Evaluation of local anaesthetic effects of *Datura metel* extract following subcutanueous injection around the scrotum

Ten West African Dwarf (WAD) goats were used for this study, with their scrotal sacs shaved and prepared aseptically. The animals were divided into two groups of five each: Group A received *Datura metel* extract subcutaneously at 75mg/kg body weight, while Group B received lidocaine at 4mg/kg body weight. A 1.5-inch, 18-gauge needle was inserted into the skin at an angle of approximately 20 degrees, and 0.5ml of the extract was deposited, raising a wheal.

The local anesthetic effect was assessed by lightly pricking the skin with a needle three times, five minutes after injection, and repeating the test at 15-minute intervals for 60 minutes. The degree of anesthesia was expressed as the number of negative responses (failure to twitch), with 3/3 indicating maximum anesthesia and 0/3 indicating no anesthesia. The extract produced a 1-2 cm wheal on the skin, and the infiltration was performed in an inverted "L" shape.The two-and -half (2.5) milliliters of the blood was centrifuge at 3000 revolutions per minutes (rpm) for 5 minutes, to obtain plasma which was used for the determination of biochemical parameters (Total protein, albumin, total bilirubin, blood urea nitrogen, creatinine, alanine aminotransferase (ALT), aspertate aminotransferase (AST), potassium (k), sodium (Na), and chloride ions.

2.7 Post-Operative Care

Following surgery, the animal received close post-operative care to minimize the risk of excessive bleeding. The buckle was placed on a course of broad-spectrum antibiotics combination of penicillin-streptomycin (Jubaili Agrotec Group Nigeria) injection at the dose rate of 1ml/25kg intramuscularly for 4 days, 5% Diclofenac Sodium injection at the dose of 1.25mg/kg body weight for 3 days (Jubaili Agrotec Group Nigeria) at the dose rate of 2.5mg/kg body weight intramuscularly twice daily for three days, and Oxytetracycline Spray (Jubaili Agrotec Group Nigeria) dressing involved removing the gauze soaked with iodine from the cavity after 24 hours and applying a wound dressing, and monitoring for signs of infection.

2.8 Ethical Clearance

The Ethical Clearance for the study was obtained from the Ethical Clearance Committee of Joseph Sarwuan Tarka University Makurdi.

Plant Identification/Collection

The plant materials (leaves, flowers, fruits, and seeds) of Datura metel were collected within the Makurdi metropolis. The plant was identified firstly by traditional medical practitioners. For authenticity, the collected plant materials were sent to the Department of Botany Research Laboratory, the Federal University of Agriculture Makurdi, for identification and confirmation of the genus and species.

2.9 Data Analysis

The mean and standard error of mean (X±SEM) were used in analyzing all experimental data. Changes in values of parameters before and after administration of the extract and lidocaine were tested for statistical significance using student T- test for unpaired data and values (p<0.05) were accepted as statistically significant

3. Results and discussion

3.1 Effects on biochemical parameters

The effects of *Datura metel* seed extract and lidocaine administered subcutaneously to WAD goats on biochemical values of the goats are shown in table 4.5. Total protein values were not affected by the extract and lidocaine administration. The AST values of extract dosed WAD goats were lower at 60, 120 and 480 min compared to the 0 min. the values of AST in the lidocaine group appear to follow the same trend as that of the extract treated group. The AST value at the 0 min was higher than the values obtained at the other times. The values of AST obtained at 120 min for both extract and lidocaine treated groups were significantly lower than those at 0 min.

Table 1: The Mean Plasma Biochemical values of WAD goats administered *Datura metel* seeds extract and lidocaine (HCl) Subcutaneously

Biochemical Parameters							
Time (min)	**Agent**	**TP (gl)**	**AST(1u/l)**	**AL T(iu/l)**	**TB (gl)**	**UREA (mg/dl)**	**ALB(g/dl)**
0	Extract	7.49±0.118	68.62±5.52	31.60±0.739	9.01±1.12	9.92±0.649	3.96±0.051
	Lidocaine	8.63±0.139[a]	101.00±0.92[a]	22.80±0.38[a]	17.02±1.39[a]	8.20±0.465	2.70±0.321
60	Extract	7.20±0.088	64.67±2.70	25.54±2.71	9.24±0.724	9.48±0.146	3.68±0.080
	Lidocaine	8.40 ±0.037	62.20±2.62[a]	17.40±2.72[a]	5.56±0.813[a]	7.30±2.136	3.10±0.067
120	Extract	7.55±0.154	53.71±5.270[b]	22.63±2.68	9.92±0.559	6.24±1.21[a]	3.64±0.183
	Lidocaine	8.54±0.012	62.30±2.040	17.30±2.37[a]	6.04±0.321[a]	7.70±1.23	3.00±0.172
240	Extract	7.66±0.154	60.69±0.544	22.21±0.829	8.71±0.610	6.56±0.642[a]	3.94±0.103
	Lidocaine	8.44±0.130	65.00±2.032[a]	20.10±0.020[a]	3.96±1.210[a]	7.30±0.062	3.10±2.032
480	Extract	7.75±0.143	60.28±2.160	23.82±3.86	11.90±4.59	7.66±0.505[a]	3.90±0.0707
	Lidocaine	8.49±0.100	66.70±3.230	16.70±2.12	4.46±1.15[a]	6.40±4.030[b]	3.10±1.160

Values are recorded as mean SE (Ẍ±SEM). within the same column b, a - values within different superscript are significantly different at $P<0.05$ when compared to the rest. TP - Total Protein, AST - Aspertate Aminotransferase, ALT - Alanine Aminotransferase, TB - Total Bilirubin, Urea - Urea Nitrogen, ALB - Albumin.

The ALT values of extract and lidocaine treated animals were higher at 0 min than at other time periods after treatments. The ALT value at 0 min was significantly higher than the values at other time periods. The same effect was observed for lidocaine.

Total bilirubin values in the group treated with the extract at the various time periods were statistically similar. Treatment with lidocaine subcutaneously resulted in statistically decreased total bilirubin at the various time period when compared with the 0 min value. The blood urea nitrogen in the extract and lidocaine treated groups were not elevated.

The albumin values in the WAD goat treated subcutaneously with *Datura metel* extract or lidocaine were significantly similar.

The plasma biochemical parameter in WAD goat dosed epidurally with *Datura metel* seed extract and lidocaine are shown in table 4.6. The total protein values in group treated with extract were similar statistically. The same effect was observed for the group treated with lidocaine.

Table 2: The mean* plasma biochemical parameters of WAD goats treated with *Datura metel* seeds extract and lidocaine HCl through epidural route

Biochemical Parameters							
Time (min)	**Agent**	**TP(g/dl)**	**AST (iu/l)**	**ALT (iu/l)**	**TB(g/dl)**	**UREA (mg/dl)**	**ALB (g/dl)**
0	Extract	7.16±0.045	72.49±0.902	32.41±0.499	10.23±0.095	10.74±0.252	4.04±0.081
	Lidocaine	8.83±0.147[a]	65.40±0.690[a]	17.60±0.469[a]	4.78±0.693[a]	7.90±0.537[a]	3.20±0.097[a]
60	Extract Lidocaine	7.11±0.0575	64.54±0.498[b]	27.44±0.503[b]	7.45±0.581[b]	9.58±0.080[b]	3.72±0.0583
		8.49±0.655	97.9±0.416[a]	21.5±0.604[a]	11.77±0.329[a]	7.60±0.068[a]	21.5±0.387
120	Extract Lidocaine	6.144±0.196	54.69±2.99[b]	19.45±1.84[b]	8.87±0.654[b]	6.84±1.17[b]	3.60±0.460
		8.69±0.971	106.2±0.58[a]	23.5±0.47[a]	10.21±0.583[a]	7.80±0.238[a]	2.80±0.570[a]
240	Extract Lidocaine	7.36±0.179	60.37±1.65[b]	20.96±1.99[b]	8.87±0.344[b]	6.16±0.424[b]	4.02±0.128
		8.42±0.193	107.70±0.64[a]	22.10±0.761[a]	9.50±0.643[a]	7.20±0.160[a]	2.70±0.261[a]
480	Extract Lidocaine	7.59±0.257	59.95±1.99[b]	19.76±0.983[b]	6.68±0.427[b]	7.22±0.462[b]	3.80±0.063
		7.84±0.675	153.00±0.79[a]	26.60±0.379[a]	9.93±0.267[a]	6.80±0.674[a]	2.60±0.426[a]

*Mean ± SEM based on three observations

a - values are significantly ($P<0.05$) increased compared to 0 min value.

b - values are significantly ($P<0.05$) decreased compared to 0 min value.

TP - Total Protein

AST - Aspertate Aminotransferase

ALT - Alanine Aminotransferase

TB - Total Bilirubin

Urea - Urea Nitrogen

ALB - Albumin

The AST values at 60, 120 and 480 min were significantly ($P<0.05$) decreased compared to the 0 min value, in goats treated with *Datura metel* extract, while in lidocaine treated group, the values were increased significantly ($P<0.05$) when compared to the 0 min value.

The ALT values in the extract and lidocaine treated goats followed the same trend as the AST values.

The total bilirubin value of the extract treated goats at 0 min was 10.23±0.10g/dl, while at 60 min post treatment it decreased to 7.45±0.58g/dl. However, at 480 min post extract treatment it was 6.69±0.43g/dl. The 0 min value of

the goats treated with lidocaine was far less (4.78±0.69g/dl) than that of extract treatment at the same time. This value increased and at 60, 120 and 480 min post lidocaine treatment the values were 11.77±0.33, 10.21±0.58 and 9.93±0.27g/dl respectively. These values were significantly (P<0.05) higher than the 0 min value.

The urea value in the group given extract at 0 min was 10.74±0.25mg/dl, the value decreased and at 480 min it was 7.2±0.46 mg/dl. The urea values for the goats treated with lidocaine were statistically similar throughout the study.

The albumin values in the goats treated with either the extract or lidocaine were similar throughout the period of the study.

3.2 Effects on electrolyte values

The electrolytes values of WAD goats administered *Datura metel* and lidocaine subcutaneously are presented in table 4.7. The creatinine value at 0 min was 50.72±0.96 mg/dl for goat treated with *Datura metel* extract, while for lidocaine treated goats it was 54.28±2.39 mg/dl. The creatinine value in the goats treated with the extract decreased at 60 min post treatment and at 480 min it was found to be 58.52±2.41 mg/dl. The creatinine value of goats treated with lidocaine increased from the pretreatment value and at 480 min the value was 61.86±2.72 mg/dl.

The sodium ion concentrations of goats treated with the extract and lidocaine were statistically similar to each other at the various time periods analysed. There was no significant (P>0.05) alteration in the potassium ion concentrations of goats treated with the extract at the 0 min compared to the other time periods. For the goats treated with lidocaine, the concentration of potassium ion was significantly (P<0.05) higher than that of the other time periods.

The chloride ion values obtained for the goats treated with the extract were significantly (P<0.05) higher than those treated with the local anesthetic (lidocaine).

Table 3: The Mean Plasma electrolytes of WAD goats administered *Datura metel* seeds extract and Lidocaine HCl through Subcutaneous route

Plasma Electrolytes					
Time (min)	**Agent**	**Creatinine (mg/dl)**	**Sodium (NA) (mmol/l)**	**Potassium K(mmol/l)**	**Chloride (Cl) (mmol/l)**
0	Extract lidocaine	50.72±0.96 54.28±2.39[a]	154.00±3.67 142.00±2.28	5.98±0.259 4.43±0.328	134.58±1.58 89.50±2.25
60	Extract Lidocaine	42.52±3.30[b] 58.87±2.23	144.60±1.40 143.00±2.13	5.75±0.138 4.26±0.108	129.30±3.34 92.40±3.36
120	Extract Lidocaine	50.29±0.66 61, 86±0.62[a]	142.60±2.93 141.08±0.37	5.69±0.262 3.64±0.870	118.30±4.58 90.40±0.49
240	Extract Lidocaine	54.31±1.75 67.89±2.32[a]	147.40±2.69 143.00±2.03	5.88±0.129 3.87±0.021	127.44±3.79 95.00±3.01
480	Extract Lidocaine	58.52±2.41 61.86±2.72[a]	146.20±2.48 145.00±2.38	5.846±0.207 4.20±0.026	123.12±2.89 94.70±2.27

* Mean ± SEM based on three observations.
a - values are significantly increased (P<0.05) compared to 0 min value.
b - values are significantly (P<0.05) decreased compared to 0 min value.

The plasma electrolytes values for WAD goats treated with *Datura metel* extract are presented in table 4.8. The creatinine values at the 0 min for the extract and lidocaine treatments were 49.00±1.02 and 67.15±1.35 mg/dl respectively. These values thereafter decreased and at 480 min the values were 47.18±3.49 and 46.47±1.47 mg/dl for the extract and lidocaine treated animals respectively. The sodium ion concentration of the extract treated goats at 0 min was significantly higher than the values at the other time periods. The sodium ion values in lidocaine treated goats followed similar trend like that of extract treated goats. The value obtained at 0 min was significantly (P<0.05) higher than the values at 120 and 480 min.

Table 4: The mean* plasma electrolytes values of WAD goats administered *Datura metel* seeds extract and lodocaine HCl through epidural route

Electrolytes values					
Time (min)	**Agent**	**Creatinine (mg/dl)**	**Sodium, (Na) (mmol/l)**	**Potassium, (K)(mmol/l)**	**Chloride, (CL)(mmol/l)**
0	Extract Lidocaine	49.00±1.02 67.15±1.35	159.20±1.24 143.00±0.62	6.41±0.093 4.06±0.90	134.18±1-29 90.30±1.607
60	Extract Lidocaine	38.02±1.08[b] 56.57±1.68[a]	143.00±4.22[b] 141.00±5.13[a]	5.75±0.0575 5.45±0.765	125.66±1.68[b] 92.10±2.67
120	Extract Lidocaine	34.04±1.42[b] 40.35±1.61[a]	119.00±7.78[b] 78.00±5.17[a]	4.87±0.418[b] 2.41±0.618[a]	115.00±6.37[b] 36.7±0.59[a]
240	Extract Lidocaine	47.43±3.46 52.81±0.52[a]	127.20±5.14[b] 143.00±0.24[a]	5.73±0.131[b] 4.71±0.213	123.74±2.84[b] 93.5±0.27
480	Extract Lidocaine	47.18±3.49 46.47±1.47[a]	140.80±1.77[b] 92.00±1.91[b]	5.40±0.190[b] 3.21±1.193[a]	121.48±3.35[b] 46.20±1.36[a]

*Means ± SEM based on three observations.
a, b - values are significantly (P<0.05) decreased compared to 0 min value.

The potassium concentration at 0 min was higher significantly from the value of 120 min, while in lidocaine treated goats the potassium concentration of 0 min was significantly (P<0.05) higher than the concentration at 120 and 480 min. The chloride ions obtained at 0 min in both extract and lidocaine treatments were 134.8±1.29 and

90.30±61 mmol/L respectively. The observed chloride ion concentrations in extract treated goats decreased at the various time periods. The values at the different time periods were significantly (P<0.05) lower than that of 0 min value. Treatment with lidocaine significantly (P<0.05) reduced the concentrations of Cl^+ at 120 and 480 min compared to the 0 min.

The liver is the major target organ of toxicity, thus making it the first organ that comes into contact with enterally absorbed chemicals. Injury to the liver may affect the integrity of hepatocytes leading to the release of membrane bound enzymes (e.g. ALT and AST), damage to hepatobiliary system thereby causing the release of essential enzyme in hepatobiliary system (e.g. ALP), and/or impair the biosynthetic and catabolic capacity of the liver (e.g. cholesterol, glucose, protein and/or albumin). In this study, it was observed that administration of the extract of *Datura metel* to goats by subcutaneous and epidural routes caused a decrease in the values of AST and ALT at various time periods compared to that of 0 min (i.e. before the extract administration). The observed decrease in these liver enzyme markers may suggest inhibition of liver activity by the extract. In an earlier study Iwu [14] reported that the therapeutic dose of *Datura metel* extract produced central nervous system depression. The absorbed extract of *Datura metel* given subcutaneously and epidurally may have produced a depressive effect that resulted in a decrease of the enzymes.

The kidney plays an important role in the body by functioning as an integrating and regulatory organ that maintains the homeostasis of the extra cellular fluid and the pH of blood in normal physiological range by excreting metabolic wastes like urea nitrogen, and creatinine and regulating the threshold of electrolytes (e.g. potassium, sodium, chloride). Thus nephrotoxic potential of a xenobiotic is strongly related to its ability to interfere with these normal biochemical processes and affect functional units of the kidney. The results of the present study showed that the *Datura metel* extract at the dose level used reduced the values of both urea and creatinine present in the blood of goats treated subcutaneously and epidurally when compared to 0 min values. Some authors have demonstrated that estimation of urea and creatinine levels is not sensitive enough in detecting a low level of renal toxicity or damage due to the great functional reserve of the kidney. The decrease in blood urea nitrogen and creatinine values observed in this study may be an indication that the extract was not nephrotoxic [30, 31, 32]. However, the observed decrease could be an indication of renal depression following the extract administration. *Datura metel* extract was observed earlier to have central depressant effect [13, 14].

The kidney's functioning capacity was assessed in this study by measuring the levels of electrolytes, creatinine and urea in the blood of the treated goats. The absence of a significant effect of the extract on blood concentrations of sodium, chloride ions, and creatinine of the animals suggest that the normal functioning of the organ in relation to these electrolytes were unaffected. The decrease noticed in the blood levels of potassium, sodium and chloride ions in this study could have arisen as a result of a depressive effect of the extract on the kidney.

4. Conclusions

1. The results from administration of seeds extract of *D. metel* by subcutaneous and epidural routes for orchidectomy showss that serum biochemical parameters of WAD buck goats were temporally altered but not compromised
2. The administration of the seed extract of *D. metel* by subcutaneous and epidural routes for orchidectomy did not compromise the liver and kidney functions of treated goats.

4.1 Recommendation for further studies

The histopathology of liver and kidney following administration of *D. metel* seed extract should be carried out in WAD goats

Conflict of Interest

The author declares no conflict of interest.

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