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Study the Effects of Analgesic and Anesthetic Drugs in Ducks

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Abstract

The experiment was carried out to determine the effects of xylazine, acepromazine and diazepam on ducks as sedative and analgesic. After anesthesia ducks were examined for their body temperature, heart rate, respiratory rate and other parameters related to sedation and analgesia. The results showed that body temperature, heart rate, respiratory rate and other parameters of ducks treated with xylazine, acepromazine and diazepam were significant ($P<0.05$). The average body temperature of ducks treated with xylazine, acepromazine and diazepam was 104.47±1.10, 105.13±0.77 and 105.71±1.02^{o}F. The average heart rate of ducks anesthetized by xylazine, acepromazine and diazepam were detected 126.20±7.44, 100.78±5.74 and 111.46±4.22 beats/min. The average respiratory rate of ducks treated with xylazine, acepromazine and diazepam was 21.31±5.23, 25.42±4.60 and 25.60±3.926 breaths/min. The onset of sedation in ducks anesthetized by xylazine, acepromazine and diazepam was recorded in 3.42±0.16, 3.46±0.16 and 4.33±0.81 minutes after drug management. The degree of sedation 4.00±0.89, 4.50±0.54 and 3.50±0.08 indicated moderate to high degree of sedation. Duration of sedation was noted in the ducks anesthetized with xylazine, acepromazine and diazepam was 67.50±22.90, 80.80±10.6 and 67.30±15.10 minutes, respectively. The duration of analgesia was higher in ducks anaesthetized by Diazepam 11.50±0.80 and 8.37±1.05 minutes by acepromazine with lowest 3.50±0.00 minutes noted by xylazine. The recovery of ducks from anesthesia was recorded in 51.00±7.21, 49.80±4.02 and 32.10±11.1 minutes, when anesthetized with xylazine, acepromazine and diazepam. In conclusion time length of analgesia was relatively delayed; accomplishing little degree of sedation and primary recovery was noted in ducks anesthetized with Diazepam.

Keywords

Drugs, Anaesthetize, Duck

1. Introduction

The rural women depended over agriculture, poultry or ducks farming. The ducks are delicate birds and any mishandling can lead to immediate shock and death. So, the administration is much important for the success of surgical point of view with the right choice of anesthesia to save the duck if it is much injured. Anesthetics are administered either gaseous or inject able but here in Pakistan mostly it is used as injection method preferred for the birds [19], compared the anesthetic effect in sixteen captive and wild-caught parrot birds, seven juveniles and nine adults successfully anesthetized multiple times with an intramuscular with medetomidine ketamine combination. Drug dosage differences appeared to be related to metabolic differences between the two size classes into metabolic scaling as a method of calculating anesthetic dosages [20], assessed the effects of 5 anesthetic drug combinations in parrot birds with ketamine, xylazine, Telazol, Telazol, detomidine, Telazol, detomidine by 5 min. All birds stood unassisted 30 min after signs of arousal [4], investigated the anaesthetic effects of intramuscular injection of Ketamine and Lignocaine

infiltration in 12 layer chickens (1.1±0.06 Kg). They concluded that in the absence of inhalatory anaesthesia, low dose ketamine and lignocaine infiltration might be a preferred anaesthetic protocol for non-protracted abdominal procedures such as laparo caecectomy in birds.

Xylazine (20mg/ml) is a potent hypnotic with powerful central muscular relaxant properties. Xylazine, detomidine and medetomidine are usually used with combination with ketamine [8]. Studied the sedative and antinociceptive effects of xylazine and detomidine and concluded that the two agents cause sedation, but that only detomidine has analgesic properties, but xylazine possesses antinociceptive effects [17]. Acepromazine is frequently used in animals as a sedative and antiemetic. Acepromazine maleate is used in veterinary medicine in dogs and cats. It can cause hypotension. In addition, acepromazine seems to make it easier for dogs with seizure disorders to have a seizure. This medication should not be used near the time of dipping or treatment with organophosphates for flea control [5]. Diazepam mostly used to treat anxiety, panic attacks, insomnia, seizures, muscle spasms, restless legs syndrome, alcohol withdrawal, benzodiazepine withdrawal, opiate withdrawal syndrome and Meniere's disease. It may also be used before certain medical procedures to reduce tension and anxiety and in some surgical procedures to induce amnesia. The pharmacological action of diazepam enhances the effect of the neurotransmitter [12]. compared the effects of medetomidine ketamine and diazepam ketamine as injectable anesthetic combinations [11], studied the effects of diazepam and chlorpromazine on response suppression in a social situation. Although chlorpromazine generally reduced response rate in all groups, diazepam selectively abolished the response suppression [10], studied twelve healthy parrot birds received xylazine – ketamine regimen and diazepam – ketamine regimen (2 mg/kg and 80 mg/kg). The effects of each combination on heart rate, respiratory rate, cloacal temperature and the foot web pinch response with the time of induction, maintenance and recovery period of anesthesia were recorded. The aim of study is to determine cardiopulmonary, sedative and analgesic effect of xylazine, acepromazine and diazepam administered IM in Ducks.

2. Methodology

For study eighteen adult and healthy ducks of female sex was purchased from a local market of Hyderabad, Sindh Pakistan. Birds were kept in cages and brought at the bird's house before two weeks the commencement of trials in department of Surgery and Obstetrics, Faculty of Animal Husbandry & Vet: Science, Sindh Agriculture University Tandojam, all birds were physically examined. Acepromazine, xylazine and diazepam was administered intramuscularly in thigh muscle of each bird. Water and feed of birds were withheld for 30 minutes and before the administration of drugs normal physiological parameters were recorded. Birds were divided into three groups named A, B and C as shown in experimental design Before starting the experiment, each bird was weighted on scale the injection site was disinfected with 70% alcohol, acepromazine, xylazine and diazepam injections was administered (IM) at the thigh muscle of the ducks by disposable syringe and the results were analyzed. Drug administration protocol in 3 groups A with each six females of duck were kept under observation those treated with xylazine 2.5 mg/kg dose in group B, acepromazine 0.25 mg/kg and group C diazepam 2.5 mg/kg, respectively. Observations were recorded on body temperature, heart rate, respiration rate, sedative parameters (onset of sedation, degree of sedation, duration of sedation, and recovery from sedation). Analgesic parameters (onset of analgesia, degree of analgesia, duration of analgesia, and recovery from sedation) were observed. Other observations (blinking of eyes, lifting of head, neck movement, wing flapping, salivation, defecation) also kept under experiment. The data was presented in (mean±SD), analysis of variance was applied to compare the significant difference between drugs and time interval using computerized statistical package SPSS- 11.5 (SPSS, 2000).

3. Results

Anesthesia traditionally meant the condition of having sensation (including the feeling of pain) blocked or temporarily taken away. It is a pharmacologically induced and reversible state of amnesia, analgesia, loss of responsiveness, loss of skeletal muscle reflexes, decreased stress response, or all of these simultaneously. These effects can be obtained from a single drug which alone provides the correct combination of effects, or occasionally a combination of drugs to achieve very specific combinations of results. The present study was carried out to determine the sedative and analgesic effects of xylazine, acepromazine and diazepam on ducks. The ducks after anesthesia were examined for their body temperature, heart rate, respiratory rate and other parameters related to sedation and analgesia.

3.1. Body Temperature (°F)

The data in regard to the body temperature of ducks as affected by anesthetic treatment of xylazine, acepromazine and diazepam is presented in Table-1; which indicated that normal body temperature was 105.30±0.88, 105.83±0.45 and 106.66±0.53^{0}F. After five minutes, the body temperature of ducks treated with xylazine, acepromazine and diazepam was 105.58±0.88, 104.67±0.39 and 106.28±0.49^{o}F, respectively. In xylazine, acepromazine and diazepam treated ducks the body temperature ranged between 101.63±0.25 to 105.58±0.10, 103.58±0.74 to 106.30±0.36 and 103.37±0.62 to 106.75±0.32^{o}F, respectively. Apart from the anesthetic drugs, the body temperature of the ducks decreased with administration of the drugs; and ducks anesthetized by xylazine reached to the baseline value after 45 minutes of treatment, body temperature of acepromazine treated ducks did not show a major change over baseline temperature and the body temperature in diazepam treated ducks also reflected to change in the body temperature. The body

temperature in xylazine treated ducks was decreased more than acepromazine and diazepam treated ducks. Statistically, the differences in the body temperature of ducks treated with xylazine, acepromazine and diazepam were significant (P<0.05).

Table 1. *Body temperature (^{0}F) of ducks affected by xylazine, acepromazine and diazepam.*

Time	Xylazine	Acepromazine	Diazepam
(minutes)	Mean±SD	Mean±SD	Mean±SD
Control	105.30±0.88	105.83±0.45	106.66±0.53
5	105.58±0.10*	104.67±0.39*	106.28±0.49*
10	105.28±0.66*	105.63±0.82*	106.03±0.53*
15	101.63±0.25**	105.50±0.65*	105.70±0.44*
20	104.77±0.36*	105.67±0.75*	105.67±0.82*
25	104.08±0.44*	105.00±0.62*	106.08±0.36*
30	103.48±0.55**	105.17±0.58*	106.08±0.11*
35	103.17±0.88**	105.67±0.89*	106.23±0.28*
40	103.63±0.99**	106.30±0.36*	106.75±0.32
45	105.42±0.10	105.73±0.44	106.70±0.52
50	104.47±0.45*	105.73±0.52	106.42±0.36*
55	104.88±0.32*	105.53±0.62*	106.75±0.82
60	105.18±0.15	103.58±0.74**	104.80±0.66**
65	105.47±0.25	103.90±0.92**	103.93±0.49**
70	105.35±0.55	104.23±0.36*	103.37±0.62**
75	104.78±0.82*	104.73±0.85*	104.87±0.32**

*Significantly difference (P>0.05); **Highly significantly difference (P>0.05).

3.2. Heart Rate (Beats/Minute)

The results pertaining to the heart rate of ducks as affected by various anesthetic drugs including xylazine, acepromazine and diazepam are shown in Table-2, which showed that normal heart rate 135.66±7.66, 110.83±5.88 and 102.50±6.30 beats/minute. After five minutes of anesthetic treatment with xylazine, acepromazine and diazepam, the heart rate of ducks in respective groups was 134.33±8.55, 98.83±6.22 and 106.83±5.12 beats/minute, respectively. In xylazine, acepromazine and diazepam treated ducks the heart rate ranged between 104.17±6.10 to 134.33±8.55, 90.17±6.22 to 110.17±7.52 and 105.17±7.20 to 116.50±6.10 beats/minute, respectively. Irrespective of anesthetic drugs, the heart rate of the ducks followed non-linear trend after treatment with anesthetic agents. Ducks anesthetized by xylazine did not reach to the baseline value even after 75 minutes of treatment. While the heart rate of ducks treated with acepromazine remained constantly lower up to 35 minutes of treatment and later increased considerably and following increasing up to the end of experiment. The ducks receiving anesthesia by diazepam reflected inconsistent heart rate throughout the experimental process. The heart rate on average in acepromazine treated ducks was significantly lower than those anesthetized by diazepam and acepromazine. Statistically, the differences in the he heart rate of ducks treated with xylazine, acepromazine and diazepam were significant (P<0.05).

Table 2. *Heart rate (beats/minute) of ducks affected by xylazine, acepromazine and diazepam.*

Time	Xylazine	Acepromazine	Diazepam
(minutes)	Mean±SD	Mean±SD	Mean±SD
Control	135.66±7.66	110.83±5.88	102.50±6.30
5	134.33±8.55*	98.83±6.22**	106.83±5.12**
10	130.83±6.10**	93.83±4.10**	111.17±4.88**
15	130.33±5.23**	97.50±7.50**	118.00±6.33**
20	127.33±6.99**	90.17±6.22**	107.17±8.10**
25	122.83±5.29**	95.67±5.10**	109.33±5.20**
30	104.17±6.10**	98.83±6.15**	106.67±6.50**
35	121.83±7.50**	96.50±7.88**	105.17±7.20**
40	119.17±6.15**	101.67±5.23**	106.83±4.25**
45	123.33±5.10**	101.50±4.58**	111.50±4.66**
50	128.33±7.50**	102.67±8.15**	113.33±8.10**
55	128.83±6.22**	107.50±6.33**	113.67±5.66**
60	127.83±4.22**	107.17±5.10**	114.17±9.10**
65	131.00±5.10*	108.50±8.56*	115.83±5.50**
70	132.83±7.15*	101.33±6.25**	116.50±6.10**
75	130.17±5.10**	110.17±7.52*	115.83±4.56**

*Significantly difference (P>0.05); **Highly significantly difference (P>0.05).

3.3. Respiratory Rate (Breaths/Minute)

In regard to respiratory rate, the results on this parameter of ducks affected by xylazine, acepromazine and diazepam are indicated in Table-3, which indicated that normal respiratory rate 24.16±11.10, 30.50±9.66 and 43.00±8.77 breaths/minute. After five minutes of anesthetic treatment with xylazine, acepromazine and diazepam, the respiratory rate of ducks was 25.00±11.56, 24.00±6.25 and 20.00±9.64 breaths/minute, respectively. In xylazine, acepromazine and diazepam treated ducks the respiratory rate ranged between 15.16±8.10 to 35.00±8.88, 19.00±7.63 to 33.66±6.88 and 19.83±8.25 to 31.50±4.86 breaths/minute, respectively. Regardless the anesthetic drugs, the respiratory rate of the ducks decreased markedly with administration of the drugs. Ducks anesthetized by xylazine reached after 75 minutes of treatment. The respiratory rate of acepromazine decreased initially and reached baseline value after 30 minutes of treatment. The respiratory rate of diazepam treated ducks was lower initially and then increased considerably and sustained increasing up to the end of experiment. The respiratory rate on average in xylazine treated ducks was significantly lower than those anesthetized by acepromazine and diazepam. Statistically, the differences in the respiratory rate of ducks treated with xylazine, acepromazine and diazepam were significant (P<0.05).

Table 3. *Respiratory rate (breaths/min) of ducks affected by xylazine, acepromazine and diazepam.*

Time	Xylazine	Acepromazine	Diazepam
(minutes)	Mean±SD	Mean±SD	Mean±SD
Control	24.16±11.10	30.50±9.66	43.00±8.77
5	25.00±11.56*	24.00±8.22**	20.00±9.64**
10	23.00±10.55*	22.00±6.35**	19.83±8.25**
15	19.16±6.88**	19.00±7.63**	23.00±9.72**
20	35.00±8.88**	20.33±8.99**	24.16±10.25**
25	16.16±10.40**	20.50±6.83**	21.16±11.30**
30	16.00±9.55**	24.83±7.25**	22.16±14.85**

Time (minutes)	Xylazine Mean±SD	Acepromazine Mean±SD	Diazepam Mean±SD
35	15.16±8.10**	23.66±6.30**	25.00±16.52**
40	15.16±6.30**	24.50±8.18**	25.33±6.82**
45	18.66±7.66**	24.00±6.21**	25.33±7.32**
50	18.66±8.10**	24.00±5.30**	28.33±6.14**
55	21.66±6.15*	30.00±6.11	28.00±5.88**
60	23.16±6.10*	32.16±7.55*	31.00±8.90**
65	24.16±8.80*	33.66±6.88*	31.50±4.86**
70	24.00±6.25*	32.33±9.25*	29.83±5.32**
75	24.83±4.50*	26.33±6.30**	29.50±7.25**

*Significantly difference (P>0.05); **Highly significantly difference (P>0.05).

3.4. Sedative Effects of Xylazine, Acepromazine and Diazepam

The results in relation to sedative effects of xylazine, acepromazine and diazepam on anesthetized ducks are shown in Table-4 which suggested that the onset of sedation in ducks anesthetized by xylazine, acepromazine and diazepam was recorded in 3.42±0.16, 3.46±0.16 and 4.33±0.81 minutes after drug administration. The degree of sedation 4.00±0.89, 3.50±0.54 and 3.50±0.08 indicates moderate to high degree of sedation, respectively. The duration of sedation in the ducks anesthetized with xylazine, acepromazine and diazepam was 67.50±22.90, 80.80±10.6 and 67.30±15.10 minutes, respectively. The recovery of ducks from sedation was recorded in 70.00±8.66, 83.40±4.55 and 70.44±9.10 minutes, when anesthetized with xylazine, acepromazine and diazepam, respectively. The onset of sedation was relatively delay, achieving moderate degree of sedation and early recovery was observed in ducks anesthetized with diazepam.

Table 4. *Sedative effects of xylazine, acepromazine and diazepam in ducks.*

Parameters	Drugs		
	Xylazine	Acepromazine	Diazepam
	Mean±SD	Mean±SD	Mean±SD
Onset of sedation (minutes)	3.42±0.16	3.46±0.16	4.33±0.81
Degree of sedation	4.00±0.89	3.50±0.54	3.50±0.08
Duration of sedation (minutes)	67.5±22.9	80.80±10.6	67.3±15.1
Recovery from sedation (minutes)	70.50±8.66	83.40±4.55	70.44±9.10

3.5. Analgesic Effects of Xylazine, Acepromazine and Diazepam

The results in relation to analgesic effects of xylazine, acepromazine and diazepam on anesthetized ducks are shown in Table-5 which suggested that the no onset of analgesia in ducks anesthetized by xylazine. While, onset of analgesia in ducks anesthetized by acepromazine and diazepam was recorded in 3.50±0.20, 9.33±1.50 minutes after drug administration. The degree of analgesia 4.00±0.89, 3.50±0.54 and 3.50±0.08 indicated moderate to high degree of analgesia, respectively. The duration of analgesia in the ducks anesthetized with xylazine, acepromazine and diazepam was 3.50±0.00, 8.33±1.05 and 12.50±11.10 minutes, respectively. The recovery of ducks from analgesia was recorded in 4.50±7.21, 9.80±4.02 and 12.50±11.10 minutes, when anesthetized with xylazine, acepromazine and diazepam, respectively.

Table 5. *Analgesic effects of xylazine, acepromazine and diazepam in duck.*

Parameters	Drugs		
	Xylazine	Acepromazine	Diazepam
	Mean±SD	Mean±SD	Mean±SD
Onset of analgesia (minutes)	0.00±0.00	3.50±0.20	9.33±1.50
Degree of analgesia	4.00±0.89	3.50±0.54	3.50±0.08
Duration of analgesia (minutes)	3.50±0.00	8.33±1.05	11.50±0.80
Recovery from analgesia (minutes)	4.5±7.21	9.80±4.02	12.50±11.10

3.6. Other Observations

The data in regard to other observations are presented in Table-6, which indicated the anesthetic effects such as blinking of eyes, lifting of head, neck movement, wing flapping, salivation and defecation in treated ducks. The results show that blinking of eyes was examined in 03, 02 and 05 ducks after administration of xylazine, acepromazine and diazepam, respectively. While lifting of head was present in 04 ducks after administration of xylazine and acepromazine; in case of diazepam lifting of head was absent. Neck movement was observed in 02, 06 and 04 ducks, wing flapping was found in 06 ducks, salivation was observed in 03, 06 and 06 ducks and defecation was examined in 01 ducks after administration of xylazine, acepromazine and diazepam, respectively.

Table 6. *Physiological observations of ducks along with drugs.*

Drugs			
Observations	Xylazine	Acepromazine	Diazepam
Blinking of eyes	Present in 03	Present in 02	Present in 05
Lifting of head	Present in 04	Present in 04	Present in all
Neck movement	Present in 02	Present in all	Present in 04
Wing flapping	Present in all	Present in all	Present in all
Salivation	Present in 03	Present in all	Present in all
Defecation	Present in o1	Present in all	Present in all

4. Discussion

Anaesthesia is most important element in the process of surgical operations; and safe and effective sedation and anaesthesia methods are as much important for birds, not only for surgical procedures but also for safe handling and diagnostic procedures, especially in case of aggressive birds. In order to determine the sedative and analgesic effects of xylazine, acepromazine and diazepam on ducks, the study was carried out during 2013. Our findings are in agreement with other scientists who used different dozes of anaesthesia on different animals or birds in throughout the world. Number of drugs used to anaesthetize the animals during surgical operations which include xylazine, acepromazine and diazepam and their combinations [9]. Intramuscular (IM) injection of xylazine smoothly induces loss of righting reflex and response to painful stimulus in leghorn roosters [16]. Xylazine, Detomidine and Medetomidine are usually used with combination with ketamine [6]. [1] studied the effects of

xylazine, ketamine, and a cocktail of them. All treatments were administered intramuscularly. They suggested that in parrots the use of xylazine (alone) was safe for handling and less painful procedures while a xylazine-ketamine cocktail was a suitable anaesthesia for painful procedures at the dosages, the results showed that statistically, the differences in the body temperature, heart rate, respiratory rate and other sedative and analgesic parameters of ducks treated with xylazine, acepromazine and diazepam were significant ($P<0.05$). The average body temperature of ducks treated with xylazine, acepromazine and diazepam was 104.47±1.10, 105.13±0.77 and 105.71±1.02^{o}F, respectively. The average heart rate of ducks anesthetized by xylazine, acepromazine and diazepam was 126.20±7.44, 100.78±5.74 and 111.46±4.22 beats/min, respectively. The average respiratory rate of ducks treated with xylazine, acepromazine and diazepam was 21.31±5.23, 25.42±4.60 and 25.60±3.926 breaths/min, respectively. The onset of sedation in ducks anesthetized by xylazine, acepromazine and diazepam was recorded in 3.42±0.16, 3.46±0.16 and 4.33±0.81 minutes after drug administration. The degree of sedation 4.00±0.89, 4.50±0.54 and 3.50±0.08 indicated moderate to high degree of sedation, respectively. The duration of sedation in the ducks anesthetized with xylazine, acepromazine and diazepam was 67.50±22.90, 80.80±10.6 and 67.30±15.10 minutes, respectively. The degree of analgesia indicated that no analgesic effects were observed in ducks anaesthetized with xylazine 0.00±00 minutes. However, moderate degree of analgesia was recorded in ducks anesthetized with acepromazine 2.00±0.00 minutes and diazepam 2.66±0.08 minutes. In case of duration of analgesia, the duration of analgesia was higher in ducks anaesthetized by diazepam 11.50±0.80 minutes, while 8.37±1.05 minutes duration of analgesia was observed in ducks anesthetized by acepromazine. The lowest 3.50±0.00 minutes, was noted in ducks anesthetized by xylazine. No onset of analgesia was found in ducks anesthetized by xylazine, while delayed onset of analgesia 9.33±1.90 minutes was found in ducks anesthetized by diazepam. The onset of analgesia was recorded 3.50±0.20 minutes in ducks anesthetized by acepromazine. The recovery of ducks from anesthesia was recorded in 51.00±7.21, 49.80±4.02 and 32.10±11.1 minutes, when anesthetized with xylazine, acepromazine and diazepam, respectively. The onset of sedation, onset of analgesia, duration of analgesia was relatively delayed; achieving moderate degree of sedation and early recovery was observed in ducks anesthetized with diazepam. These results are fully supported by the findings of [3], who reported combined application of Detomidine-ketamine for rapid anaesthesia in parrots; while [7], suggested combination of ketamine + detomidine or diazepam for effective and safe anesthesia in parrots for surgical operations. Similarly [15], used xylazine and diazepam combination and medetomidine + detomidine and did not notice any significant change in heartbeat, respiration and body temperature. Moreover, [14], used medetomidine-ketamine and diazepam-ketamine combination in parrots; while [2], have also reported combined application of anaesthetic agents for deeper anesthesia for surgicaloperations of birds. The body temperature in xylazine treated ducks was decreased more than acepromazine and diazepam treated ducks. Statistically, the differences in the body temperature of ducks treated with xylazine, acepromazine and diazepam were significant ($P<0.05$). On the basis of findings of the present research, it is suggested that for anesthetizing ducks for any surgical operation, xylazine may preferably be used for required sedative effects on ducks.

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