Effect of Ketamine-Xylazine Anesthesia on Some Hematological and Serum Biochemical Values of Bozova Greyhounds

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Abstract: The combination of ketamine HCl and xylazine HCl has been used to immobilize numerous wild and domestic carnivores. The aim of this study was to determined heamotological and biochemical effects of xylazine-ketamine anesthesia on Bozova greyhounds. In this study the anesthetic effects of the ketamine and xylazine were investigated in 8 greyhounds which were in different age, body weight and sex. The animals were injected with the ketamine (10 mg/kg) and xylazine (1 mg/kg) intramuscularly. Heamotological and biochemical findings were recorded before and during anesthesia. The study show that there were no significant differences between before and during anesthesia heamotological and biochemical effects of xylazine-ketamine anesthesia on Bozova greyhounds except increase of glucose, CK and desrease of TP, TRG. In this study; results demonstrated that the combinations of ketamine and xylazine can be used in practice as anesthetics in Bozova greyhounds.
Keywords: *Anesthesia, Bozova greyhound, greyhound, ketamine, xylazine*

Bozova Tazılarında Ketamin-Ksilazin Anestezisinin Bazı Hematolojik ve Biyokimyasal Parametreler Üzerine Etkisi

Özet: Ketamin HCl ve Ksilazin HCl kombinasyonu çok sayıda yabani ve evcil karnivorları immobilize etmek için kullanılmıştır. Bu çalışmada Bozova tazılarında Ksilazin-ketamin anestezinin heamotological ve biyokimyasal etkilerinin araştırılması amaçlandı. Farklı yaş, vücut ağırlığı ve cinsiyetteki 8 tazıya Ketamin (10 mg / kg) ve ksilazin (1 mg / kg) dozunda kas içi enjekte edildi. Hematolojik ve biyokimyasal değerlendirme için anestezi öncesi ve anestezi sırasında kan örnekleri alındı. Bu çalışmada; glikoz ve CK seviyelerinde artış ($p<0.05$) ile TP ve TRG seviyelerinde azalış ($p<0.05$) tespit edildi. Elde edilen sonuçlar ketamin ve ksilazin kombinasyonunun Bozova tazılarında anestezik olarak kullanılabileceğini göstermiştir.
Anahtar Kelimeler: *Anestezi, Bozova Tazısı, tazı, ketamin, ksilazin*

Introduction

Ketamine hydrochloride, a dissociative anesthesia, general anesthetic and tranquilizer is administered intravenously or intramuscularly (Stoelting, 1999; Hall and Clarke, 1991b). The cyclohexane, ketamine is a rapid acting general anesthetic producing an anesthetic state characterized by profound analgesia, normal pharyngeal-laryngeal reflexes, cardiovascular and respiratory stimulation, and occasionally a transient and minimal respiratory depression (Hall and Clarke, 1991**a**; Haskins et al., 1986). Ketamin's muscle relaxation is poor, but is improved by sedatives such as diazepam or xylazine (Hall et al., 2001; Hirota and Lambert, 1996). Xylazine is a α_2-adrenoceptor agonist. For the induction of general anesthesia, it is used as a premedicant and has a favourable myorelaxant effect (Green and Thurman, 1981; Paddleford and Harvey, 1999).

The combination of ketamine HCl and xylazine HCl, has been used to immobilize numerous wild and domestic carnivores (Knight, 1980; Herbstl et al., 1985; Terry et al., 1986; Haskins et al., 1986; England and Clarke, 1989; Tranquili and Benson, 1992). These drugs usually result in a smooth induction and recovery with the pressor and cataleptic effects of ketamine HCl being ameliorated by the depressor, sedative and

myorelaxing effects of xylazine HCl (Parry. et al., 1981, Terry et al., 1986).

The combination of ketamine HCl and xylazine HCl anesthesia is very useful and safe in dog, because of invariable status in physiological function, hematologic and biochemical parameters (Gulanber et al., 2001). "Bozova Greyhounds" were raised villages of around Bozova town of Sanliurfa city in Turkey and they were used to hunting. To our knowledge, it is only a few article reported on ketamine and xylazin anesthesia effects of clinical parameters but not about hematologic and biochemical parameters on the greyhounds (Hellyer et. al., 1991; Thomson et al., 1988) and no study has been reported anesthesia on Bozova Greyhounds. Therefore, the purpose of this study was to determined heamotological and biochemical effects of xylazine-ketamine anesthesia on Bozova greyhounds.

Materials and Methods

This study was carried out on eight mature Bozova greyhounds which were in different age, body weight and sex were used. All were health and with no congenital or acquired abnormalities. Greyhounds were fasted for 12 h, but permitted to drink water, and then they were used in the study. The animals were nominated for the administration of ketamine and xylazine their body weight varied from 15 to 25 kg with an average of 21,62 kg, and the age varied between 1 and 7 years (average 3.13 years). There were 2 females and 6 males greyhounds were used in the study.

The greyhounds were given 1 mg/kg of xylazine HCl and 10 mg/kg of ketamine HCl were mixed and administrated by intramuscular (im) route. An indwelling catheter was applied into the vena cephalica antebrachii. The vein was preferred for obtaining blood samples for hematological and biochemical analyses. Then weigh of animals estimated for give drugs. The blood samples were given before anesthesia and during the anesthesia 30 minute.

Blood was withdrawn from the vena cephalica antebrachii. Samples were kept in test tubes containing heparine for hematological parameters and in vacutainer tubes for biochemical analyses. All samples were evaluated on the same day. Blood samples for biochemical analyses were centrifuged at 3,000 rpm for 10 min, and the serum was decanted. Then the biochemical parameters were obtained using an autoanalyzer (Saturno100 Vet). Hematological values were measured by cell counter (MS4).

The statistical analysis of the data was carried out with the SPSS software 10.0 (SPSS Inc., Chicago, IL, USA). Paired t test were used to compare the hematologic and biochemical parameters before and during the anesthesia. Values obtained were expressed as mean ± S.D. The differences were considered to be significant when $P < 0.05$.

Results

There were no significant differences between baseline and during anesthesia values of hematological parameters (WBC, RBC, PLT, HCT and Hb) (Table 1.). There were no significant differences between before and during anesthesia on some biochemical Parameters (AST, ALT, ALP, GGT, LDH, Kreatinin, ALB, GLB, Cholesterol, urea, uric acid, TBİL, DBİL, Ca, Na, K and Cl). On the other hand, Glucose and CK values increase TP and TG values were decrease statically significant than before anesthesia (Table 2.).

Table 1. Heamotologic parameters.

Parameters Values	Mean ± Std. Dev.		P
	B.A.	D. A.	
WBC (x 10^3/µl)	4,34±2,05	4,16±2,00	-
RBC (x 10^6/µl)	8,13±1,15	7,98±0,93	-
PLT (x 10^5/µl)	2,1±1,43	2,07±1,63	-
HCT %	51,15±5,68	49,7±5,06	-
Hb (gr/dl)	20,30±3,14	19,53±2,04	-

B.A: Before anesthesia, D.A: During anesthesia, Mean value differs significantly (P<0.05).

Table 2. Biochemical parameters

Parameters Values	Mean ± Std. Dev.		P
	B.A.	D.A.	
Glucose mg/dl	117,38±37,79	162,25±42,00	*
AST U/L	54,13±06,31	59,25±10,61	*
ALT U/L	51,75±17,10	51,50±15,29	
ALP U/L	138,13±26,43	131,25±16,13	
GGT U/L	3,75±1,39	4,38±1,60	
LDH U/L	682,13±147,82	828,25±252,91	*
CK U/L	320,63±50,97	469,50±143,16	*
Creatinine mg/dl	0,58±0,11	0,57±0,10	*
TP g/dl	6,40±0,71	6,08±0,52	*
ALB g/dl	3,55±0,22	3,49±0,18	
GLB g/dl	2,88±0,62	2,66±0,47	*
TG (triglycerides) mg/dl	56,88±4,79	38,50±08,94	*
Cholesterol (CHL) mg/dl	136,75±14,59	129,63±16,12	
URE mg/dl	23,13±5,03	23,63±6,02	
Uric Acit mg/dl	0,60±0,14	0,54±0,14	
TBIL mg/dl	0,62±0,13	0,61±0,27	
DBIL mg/dl	0,33±0,18	0,33±0,13	
Ca mg/dl	6,60±0,51	6,46±0,43	
Na mEq/l	134,05±1,82	136,09±5,77	
K mEq/l	37,55±1,04	39,2±2,95	
Cl mEq/l	99,29±2,92	99,46±2,51	

B.A: Before anesthesia, D.A: During anesthesia, Mean value differs significantly (P<0.05).

Discussion

There was no found report in literature about effects on hematological and biochemical parameters of ketamine-xylazine in greyhounds. Therefore the results of this study have been discussed with those from studies on dogs and the other species. Because of the invariable status in physiological function, heamotologic and biochemical parameters, blood values, ketamine-midazolam anesthesia very useful and safe in dogs but decrease of hematocrit percentage were significantly (Gulanber et al., 2001).

Chauhan and Pandey (2006), said that the haematological parameters like PCV, haemoglobin, erythrocyte count and leucocyte count did not show any significant change in fentanyl-ketamine combinations in dogs. However, lymphocytosis with neutropenia was notice. Demirkan et al. (2002), said that a decrease packed cell volume (haematocrit) and an increase of leukocyte number were recorded in ketamine- xylazine anesthesia in the dog. Non-significant alterations in venous erythrocytes, leucocytes, hematocrit and haemoglobin values for combination of ketamin-xylazin indicated a good tissue perfusion during the anaesthesia in dogs (Tobias and Schertel, 1992; Atalan, et al., 2002; Gulanber et al., 2001). However both Atalan, et al. (2002) and Gulanber et al. (2001) emphased that decrease of hematocrit percentage were significantly. In this study, There were no significant difference between before and during anesthesia However hematocrit values were decrease during the anesthesia like investigator findings (Atalan, et al., 2002; Demirkan et al., 2002; Gulanber et al., 2001), but the decrease were not statically significant.

Ismail et al. (2010) said that investigate effects of ketamin-xylazin-diazepam anesthesia on plasma biochemical values in sheep and goats. The result of the study show that there were no significant difference between before and during ketamine-xylazin anesthesia in AST, ALT, GGT, Creatinin, ALB, Urea in sheep but there were statically significant an increase Glucose during the anesthesia than the baseline values in goats.

Gulanber et al, (2001) emphased that the invariable status in biochemical parameters (Urea, creatinine, AST, ALT, ALP, GGT, LDH), via

midazolam–ketamine anesthesia in dogs. Biochemical parameters, ALT, ALP, total bilirubin, BUN and creatinine showed significant increase, in fentanyl-ketamin in dogs (Chauhan and Pandey, 2006). Luna et al., (2000), investigate Romifidine or xylazine combined with ketamine in dogs premedicated with methotrimeprazine at the end of the study it was found that Na and Ca were not but The K values were significant decrease from the baseline values (Luna et al., 2000). The blood Na and Ca decreased with time during the whole period of anesthesia (Kilic, 2008). In this study there were no significant changes when the results comped the baseline values in AST, ALT, ALP, GGT, LDH, creatinine, ALB, GLB, Cholesterol, Urea, Uric acid, TBİL, DBİL, Na, K and Cl.

Investigators were found that statistically significant increase in Glucose values after xylazine/ketamine administration in deer, sheep, dogs, (Ismail et al., 2010; Gulanber et al., 2001; Kilic, 2008; Luna et al., 2000; Stewart and English, 1990). Because of there have been many investigations into the hyperglycaemic effects of xylazine in different species The hyperglycaemic effects of xylazine is well known (Chauhan and Pandey, 2006; Gulanber et al., 2001; Ismail et al., 2010; Kilic, 2008; Luna et al., 2000; Stewart and English, 1990). The effects might be to the result of α2- adrenergic receptor inhibition of insulin release by the stimulation of α2-adrenoreceptors in the pancreatic β cells and to an increased glucose production in the liver (Angel and Langer, 1988; Hsu and Hummel, 1981; Kilic, 2008). CK values could increase via Intramuscular injection, surgical manipulations and some drug effects **(**Burtis and Ashwood, 1999). In this study there were statically significant increases of Glucose and CK values during the anesthesia then before anesthesia.

Investigator emphased that there were no significant change in TP during the ketamine and xylazine anesthesia in dogs (Chauhan and Pandey, 2006; Gulanber et al., 2001), sheeps and goats (Ismail et al., 2010). But Stewart and English, (1990) said that analysis of biochemical data showed consistent, statistically significant changes in total plasma protein (TPP) decrease in deer after xylazine/ketamine administration. Cevik et al. (1991), has been reported that triglyceride levels can be decrease during the anesthesia. This situation has been connected to falls of cholinesterase activity. In this study, TP and TG decrease significantly during the anesthesia than baseline values. It may be beneficial that to take into consideration this condition assessment of cholinesterase activity in subsequent studies on greyhounds.

In conclusion there were no significant differences between before and during anesthesia heamotological and biochemical effects of xylazine-ketamine anesthesia on Bozova greyhounds except increase of glucose, CK and decrease of TP, TRG values. Ketamine and xylazine could be used for Bozova and others greyhounds anesthesia safety.

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