

# HAEMATOLOGICAL AND SERUM BIOCHEMICAL VALUES OF URBAN WILD BOAR (*Sus scrofa*) IN BARCELONA



Marc Adsuar López June 2016

## INTRODUCTION and OBJECTIVES

The wild boars (*Sus scrofa*) population are increasing its density in Catalonia, owing to several factors such as the lack of natural predators, better access to food, changes in weather conditions and increased breeding. This increase means that wild boars have to look for more food to survive, so they get it closer to civilization.

The aim of this study is to analyze the haematologic and biochemical variables of the wild boars captured in the streets of Barcelona, to make a comparison with recent studies of captured animals of the same species, which are less in contact with civilization. Haematological and biochemical variable records distinguish age and gender, so that their influence is taken into account.

## MATERIALS AND METHODS

A total of 97 wild boars were studied. An approximate age was determined by state of dentition. The samples were taken after urban police phoned a SEFa people because wild boars were causing trouble on the streets. Piglets, juveniles and adult wild boars were anesthetized using a combination of tiletamina-zolazepam (6.9 ± 1.8 mg/kg) and xylazine (3.5 ± 1.1 mg/kg), administered by a blowpipe. The samples were processed for analysis during 24 hours after extraction and were kept refrigerated until arrival at the laboratory. The collected serum samples were frozen at -20 °C at the time of evaluation.

Table: Mean of body weight, for different sex and age groups

	Females (kg)	Males (kg)	Total
Piglets (0-6 months)	10 (5.38 ± 1.85)	5 (4.17 ± 0.58)	15 (5.05 ± 1.67)
Juveniles (> 6-12 months)	16 (30.31 ± 12.21)	18 (26.97 ± 11.52)	34 (28.54 ± 11.79)
Adults (from > 12 months)	20 (55.98 ± 14.76)	28 (52.56 ± 16.15)	48 (54.04 ± 15.49)
<b>Total</b>	<b>46</b>	<b>51</b>	<b>97</b>



## RESULTS

Tables: hematologic and biochemical interval references of wild boar from Barcelona

Variable (units)	Number of samples (n)	Mean (sd)	CV (%)	Range (Min-Max)	Central 95 per cent interval
White blood cells (x 10 <sup>9</sup> /L)	74	11.54 ± 3.47	28.08	4.15 - 19.53	10.51 - 13.49
Red blood cells (x 10 <sup>12</sup> /L)	74	5.79 ± 0.72	12.52	4.31 - 7.85	5.62 - 5.96
Haemoglobin (g/L)	76	119.6 ± 18.97	15.86	82 - 190	115.4 - 123.9
Haematocrit (L/L)	74	0.35 ± 0.05	12.80	0.24 - 0.47	0.34 - 0.36
MCV (fL)	76	60.82 ± 5.6	9.20	51.9 - 78.3	59.54 - 62.10
MCH (pg)	76	20.43 ± 2.19	10.71	15.9 - 25	19.93 - 20.93
MCHC (g/L)	72	338.4 ± 19.1	5.60	293 - 381	334.1 - 342.9
Neutrophils (%)	76	48.14 ± 15.42	32.02	20.9 - 87.5	44.62 - 51.67
Lymphocytes (%)	76	43.36 ± 13.85	31.93	9.4 - 70.9	40.2 - 46.52
Monocytes (%)	76	4.78 ± 1.91	40.02	1.2 - 9.2	4.34 - 5.22
Eosinophils (%)	76	2.35 ± 1.95	82.89	0.3 - 9.6	1.91 - 2.80
Basophils (%)	76	0.94 ± 1.01	107.13	0.1 - 7.1	0.72 - 1.17
Neutrophils (x 10 <sup>9</sup> /L)	74	5.34 ± 2.58	50.06	1.25 - 13.23	4.73 - 5.96
Lymphocytes (x 10 <sup>9</sup> /L)	76	4.89 ± 1.79	37.10	1.49 - 10	4.45 - 5.33
Monocytes (x 10 <sup>9</sup> /L)	74	0.51 ± 0.25	41.19	0.13 - 1.14	0.46 - 0.55
Eosinophils (x 10 <sup>9</sup> /L)	76	0.26 ± 0.23	88.07	0.04 - 1.17	0.21 - 0.32
Basophils (10 <sup>9</sup> /L)	73	0.05 ± 0.03	61.80	0.01 - 0.16	0.04 - 0.06
Platelets (x 10 <sup>9</sup> /L)	74	422.32 ± 159.58	37.78	11 - 834	385.96 - 458.66

Variable (units)	Number of samples (n)	Mean (sd)	CV (%)	Range (Min-Max)	Central 95 per cent interval
Cortisol (nmol/L)	97	244.55 ± 197.13	80.61	20.18 - 1057.30	204.82 - 284.28
Glucose (mmol/L)	94	6.23 ± 1.93	30.91	2.53 - 12.25	6.84 - 6.61
Cholesterol (mmol/L)	94	2.51 ± 1.29	34.63	0.46 - 4.23	2.33 - 2.69
Triglycerides (mmol/L)	97	0.62 ± 0.5	79.60	0.07 - 2.84	0.52 - 0.72
Total bilirubin (μmol/L)	93	2.68 ± 0.78	29.07	0.17 - 5.47	2.52 - 2.84
Lactate (mmol/L)	91	3.83 ± 1.67	43.60	1.7 - 9.1	3.49 - 4.17
Creatinine (μmol/L)	97	92.22 ± 25.18	27.30	44.2 - 145.86	87.14 - 97.29
Urea (mmol/L)	95	4.02 ± 1.51	37.30	1.23 - 8.31	3.73 - 4.32
CK (IU/L)	95	1062 ± 1430	134.58	98.5 - 10056.9	775.13 - 1350.3
LDH (IU/L)	91	769.52 ± 310.61	40.36	180.6 - 1660.4	705.72 - 833.34
AST (IU/L)	96	62.68 ± 73.95	117.99	6.01 - 531	47.88 - 77.47
ALT (IU/L)	97	41.23 ± 20.48	49.66	11.1 - 143.4	37.1 - 45.35
AP (IU/L)	95	83.13 ± 43.41	52.21	8.07 - 266.65	74.29 - 91.85
Sodium (mmol/L)	97	133.2 ± 15.31	15.70	66.4 - 155.9	128.43 - 136.3
Chloride (mmol/L)	97	92.4 ± 8.2	8.40	50.3 - 110.8	90.46 - 95.21
Potassium (mmol/L)	96	4.92 ± 1.27	25.71	2.63 - 9.46	4.66 - 5.17
Total protein (g/L)	95	65.06 ± 9.07	13.94	41 - 84	63.24 - 66.88

Table: Statistically significant age differences

Variable (units)	n	Adults		Juveniles		Piglets		Greater effect
		n	Mean (sd)	n	Mean (sd)	n	Mean (sd)	
WBC (10 <sup>9</sup> /L)	26	10.76 (2.99)a	26	11.15 (3.63)ab	10	13.61 (3.64)b	Female	
MCV (fL)	35	63.98 (5.01) a	31	58.16 (4.52) b	10	58.02 (5.15) ab	Both	
MCH (pg)	35	21.44 (1.8)a	31	19.75 (2.07)b	10	19 (2.36) b	Both	
Neutrophils (%)	35	48.31 (15.27)ab	31	44.47 (14.69) a	10	58.92 (14.28) b	-	
Lymphocytes (%)	35	43.79 (14.09)ab	31	45.91 (12.78) a	10	33.91 (13.41) b	-	
Monocytes (%)	35	4.2 (1.82)a	31	5.6 (1.73)b	10	4.25 (1.98) a	Male	
Neutrophils (x 10 <sup>9</sup> /L)	35	5.32 (2.88) a	29	4.58 (1.96) a	10	7.64 (2.57) b	Both	
Lymphocytes (x 10 <sup>9</sup> /L)	26	4.44 (1.36)a	28	5.4 (1.82)b	10	4.67 (2.5)ab	-	
Monocytes (x 10 <sup>9</sup> /L)	35	0.42 (0.17)a	29	0.59 (0.2)b	10	0.54 (0.26) ab	Both	
Basophils (x 10 <sup>9</sup> /L)	34	0.036 (0.019)a	31	0.056 (0.031)b	8	0.05 (0.04)ab	Both	
Platelets (x 10 <sup>9</sup> /L)	34	325.24 (119.53)a	31	502.16 (143.53)b	9	514.11 (148.19)b	Both	
Cholesterol (mmol/L)	45	2.42 (0.71)a	33	2.48 (1.08) ab	13	2.9 (0.77)b	Female	
AP (IU/L)	45	65.74 (34.08)a	34	85.98 (39.76)b	13	130.58 (45.8)c	Both	
Creatinine (μmol/L)	35	107.75 (18.33)a	31	82.09 (20.39)b	13	57.6 (8.98)c	Both	
Lactate (mmol/L)	44	3.93 (1.32)a	32	3.16 (1.51)b	12	5.17 (2.48)c	Both	
Chloride (mmol/L)	33	94.86 (6.65)a	25	93.63 (9.18)ab	12	89.78 (8.25)b	-	
Potassium (mmol/L)	46	5.24 (1.17) <sup>a</sup>	34	4.55 (1.36) <sup>a</sup>	13	4.53 (1.13) <sup>a</sup> *	Male	
Total protein (g/L)	47	68.3 (8.01)a	32	63.43 (9.22)b	13	58.82 (5.99)b	Both	

Table: Statistically significant sex differences

Variable (units)	Female		Male		p-value	Greater effect
	n	Mean (sd)	n	Mean (sd)		
MCV (fL)	29	63.19 (6.07)	37	59.72 (4.69)	0.033	Adult
MCH (pg)	29	21.41 (2.03)	37	20.05 (1.97)	0.008	Adult
Neutrophils (%)	29	41.47 (14.51)	37	50.46 (14.37)	0.004	Juvenil
Lymphocytes (%)	29	49.23 (13.4)	37	41.31 (12.57)	0.005	Juvenil
Basophils (%)	28	0.55 (0.32)	37	0.35 (0.22)	0.0014	Both
Neutrophils (x 10 <sup>9</sup> /L)	28	4.26 (2.28)	36	5.55 (2.59)	0.025	Both
Basophils (x 10 <sup>9</sup> /L)	28	0.057 (1.13)	37	0.037 (0.017)	0.0022	Juvenil
Urea (mmol/L)	38	4.48 (1.59)	45	3.62 (1.28)	0.013	Adult
AST (IU/L)	38	85.75 (103.27)	46	39.67 (30.23)	0.00022	Both
ALT (IU/L)	39	48.85 (24.63)	46	35.89 (16.52)	0.007	Adult



## DISCUSSION and CONCLUSIONS



### Sex effect

- Increased white blood cell and platelets count in adult males, when compared to adult females.
- A higher percentage and neutrophil count and a lower percentage of lymphocytes, for the males adults and juveniles group, compared to adult females and juveniles. It is consistent with a leukogram of stress.
- A higher values of AST, ALT, urea and triglycerides for the females compared to males

### Age effect

- Decreased white blood cell counts, neutrophils, monocytes, basophils, platelets, cholesterol, lactate and alkaline phosphatase values, with age, as well as increased lymphocytes values with age.
- Increased MCV, MCH, total protein concentration, creatinine, potassium with age

### Anesthesia effect

- The positive correlation between the anesthetic dose and the cortisol and neutrophil count, along with the negative correlation with the lymphocytes and eosinophils count, is consistent with increased stress.
- Higher anesthetic doses had to be administered in wild boars showing higher stress levels before capture.

In conclusion, the wild boars captured in Barcelona not show biologically important differences in haematological and biochemical values. However, these results can serve to establish a baseline for better interpretation of results haematological and biochemical in wild boars of different ages and with a chemical method of capture.

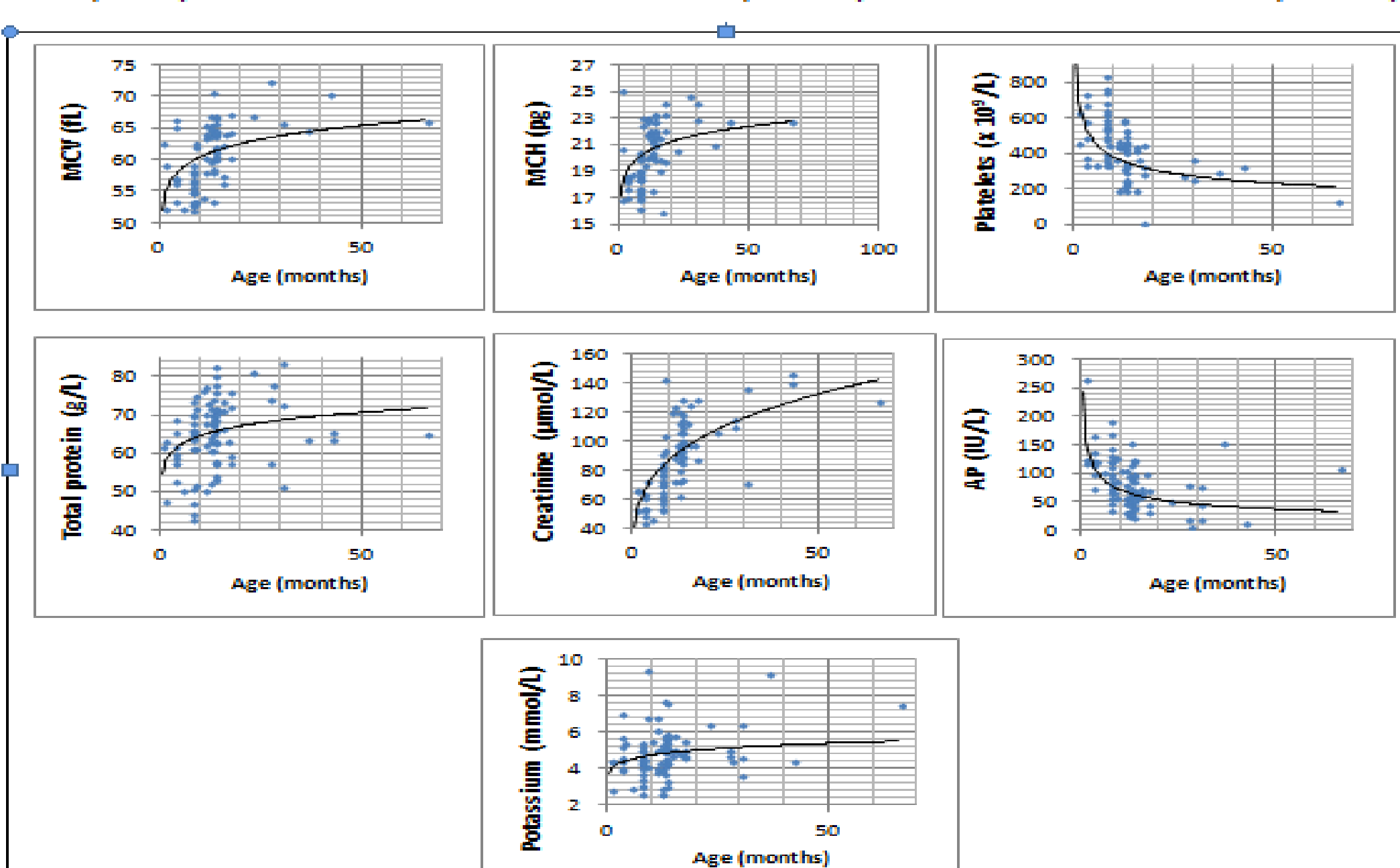


Figure: Correlation between anesthetic dose and variable.

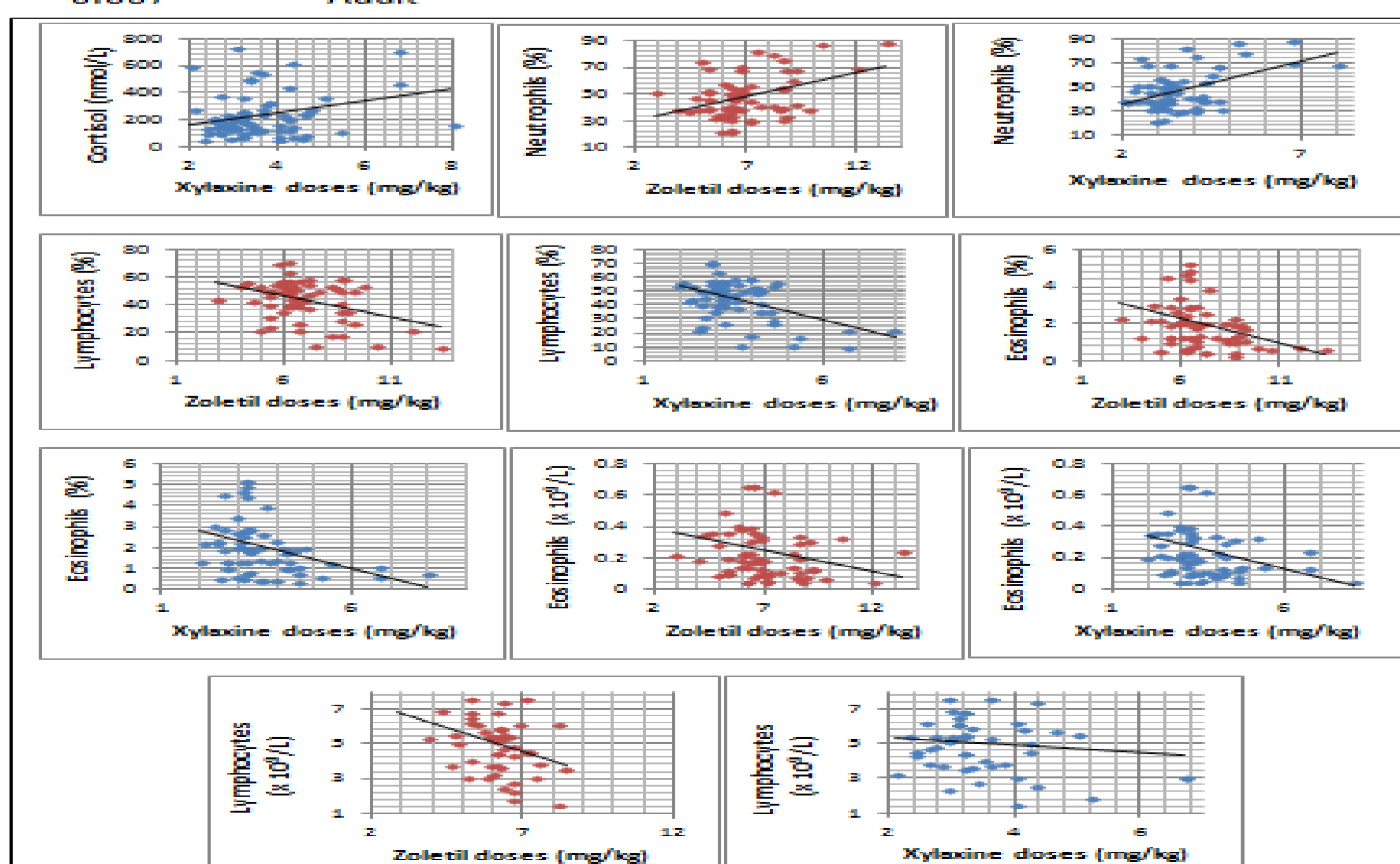


Figure: Correlation between variable and age