RESULTS

RESULTS

A . Effect of a Single Oral Dose :

I. Effect of a Single Oral Dose (1/2 LD_{50}) of Propoxur on Blood Parameters :

1.Blood Cells Count :-

a. White Blood Cells (WBCs) Count : -

The effects of a single oral dose (1/2 LD_{50}) of propoxur on white blood cells count are presented in table (1) and figure (1).White blood cells count increased significantly 3, 6, and 12 hrs. post–treatment, (15.2 x 10^3 cell / mm^3, 21.4 x 10^3 cell / mm^3 and 21.2 x 10^3 cell / mm^3), respectively as compared to the corresponding one of control birds (11.4 x10^3 cell / mm^3). Non-significant change was observed in white blood cells count 24 hrs. post–treatment (14.4 x 10^3 cell / mm^3) .

b. Red blood cells (RBCs) count : -

The effects of a single oral dose (1/2 LD_{50}) of propoxur on red blood cells count are presented in table (1) and figure (2). Red blood cells count decreased significantly 3, 6, 12 and 24 hrs. post–treatment (2.73 x10^6 cell/mm^3, 2.56 x 10^6 cell/mm^3, 2.52 x10^6 cell/mm^3 and 2.56 x10^6 cell/mm^3), respectively as compared to the corresponding one of control birds (3.23 x10^6 cell/mm^3).

2) Haemoglobin content (Hb) : -

Treatment of pigeons with a single oral dose (1/2 LD_{50}) of propoxur caused non-significant decrease in haemoglobin content 3, 6, 12 and 24 hrs. post–treatment (14.46 g/dl, 14.30 g/dl, 13.54 g/dl and 13.86 g/dl), respectively

Table (1) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on blood parameters of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE	*Duration of Experiment (hrs.)*				
	Control	*3*	*6*	*12*	*24*
WBCs ($\times 10^3$ Cell /mm^3)	$11.4^{acd} \pm 1.64$	$15.2^{bcd} \pm 2.11$	$21.4^{abcde} \pm 1.02$	$21.2^{abde} \pm 1.45$	$14.4^{cde} \pm 1.73$
RBCs ($\times 10^6$ Cell /mm^3)	$3.23^{abcde} \pm 0.12$	$2.73^{ab} \pm 0.17$	$2.56^{ac} \pm 0.17$	$2.52^{ad} \pm 0.20$	$2.56^{ae} \pm 0.15$
Hb (g/dl)	15.07 ± 0.22	14.46 ± 1.61	14.30 ± 0.86	13.54 ± 1.34	13.86 ± 1.22
Hct (%)	$45.12^{ae} \pm 0.48$	46.04 ± 1.86	49.16 ± 2.97	49.90 ± 2.95	$50.74^{ae} \pm 1.72$
MCV (μ^3)	$154.7^{ae} \pm 12.20$	164.78 ± 10.17	181.16 ± 8.85	181.32 ± 12.50	$201.00^{ae} \pm 8.80$
MCH (Pg)	52.98 ± 2.37	51.64 ± 4.75	51.40 ± 2.49	51.22 ± 2.06	55.52 ± 1.19
MCHC (%)	31.94 ± 2.79	30.96 ± 3.04	29.82 ± 1.68	30.81 ± 2.05	32.58 ± 0.94

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

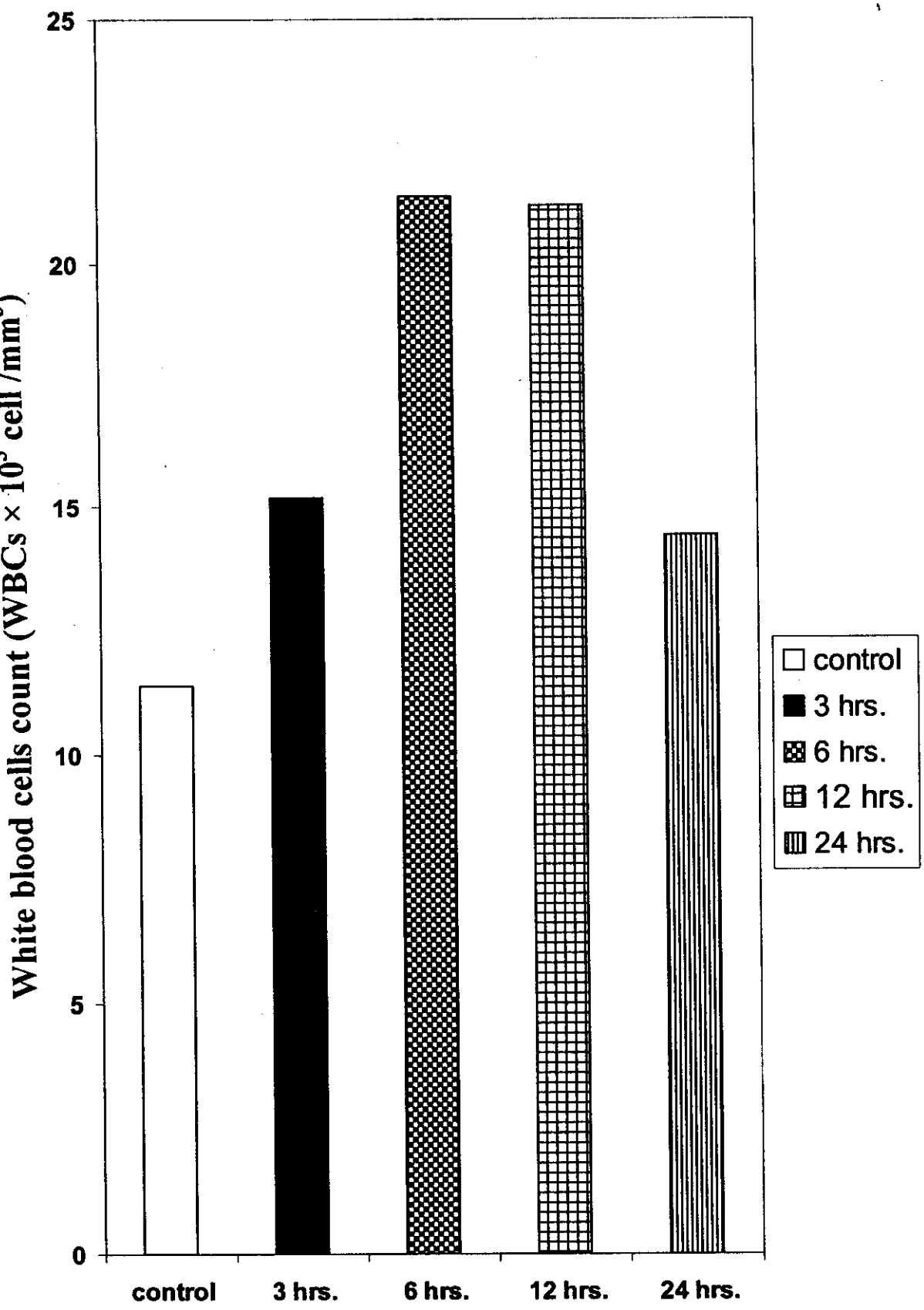

Figure (1) :Effect of a single oral dose (1/2 LD_{50}) of propoxur on white blood cells count (WBCs) of pigeon after 3, 6, 12 and 24 hours of treatment .

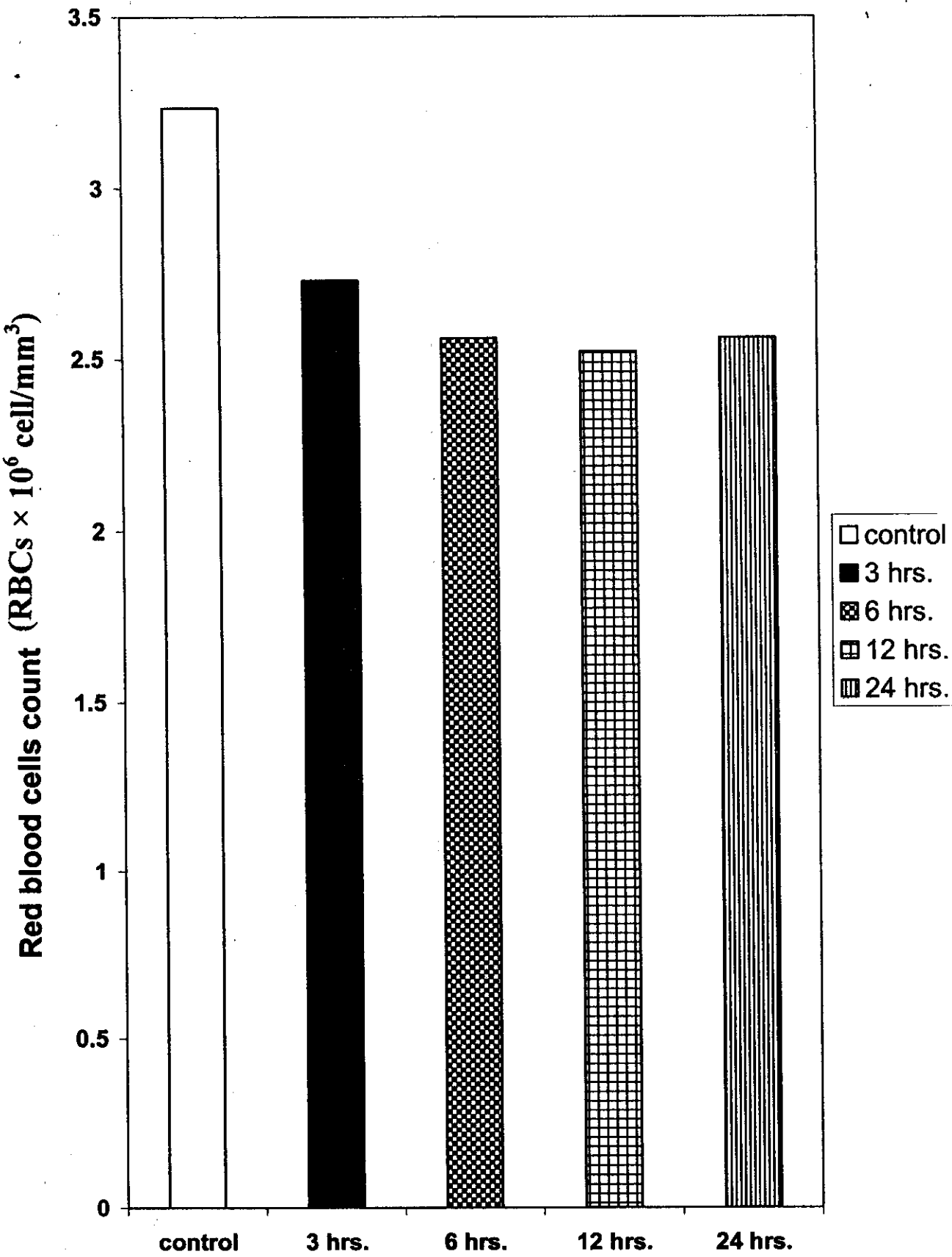

Figure (2) :Effect of a single oral dose (1/2 LD_{50}) of propoxur on red blood cells count (RBCs) of pigeon after 3, 6, 12 and 24 hours of treatment .

as compared to that of the control group (15.07 g/dl). These data were shown in table (1) and in figure (3).

3) Haematocrite value (Hct) : -

Haematocrite values for different experimental animal groups (control, 3, 6, 12 and 24 hrs. post–treatment) were presented in table (1) and figure (4). Haematocrite value increased significantly at 24 hrs. post – treatment (50.74 %) as compared with control group (45.12 %).Non-significant changes were observed in haematocrite value of pigeons, 3 hrs. (46.04 %), 6 hrs. (49.16 %) and 12 hrs. (49.90 %) post–treatment with a single dose (1/2 LD_{50}) of propoxur as compared to that of control group (45.12 %).

4) Blood indices : -

a. Mean cell volume (MCV) : -

The effects of a single oral dose (1/2 LD_{50}) of propoxur on MCV are presented in table (1) and figure (5). Significant increase was found in MCV 24 hrs. post –treatment (201 μ^3) as compared with that of control group (154.70 μ^3). Non-significant changes were observed in mean cell volume 3 hrs. (164.78 μ^3), 6 hrs. (181.16 μ^3), and 12 hrs. (181.32 μ^3) post-treatment as compared to that of the control group (154.70 μ^3).

b. Mean cellular haemoglobin (MCH) : -

The MCH level showed non-significant decrease subsequent to 3, 6 and 12 hrs. of propoxur treatment (51.64 Pg) ,(51.40 Pg) and (51.22 Pg), respectively. However; after 24 hrs. of propoxur treatment the MCH showed a non-significant increase (55.52 Pg) as compared to that of control value (52.98 Pg).These data are presented in table (1) and figure (6).

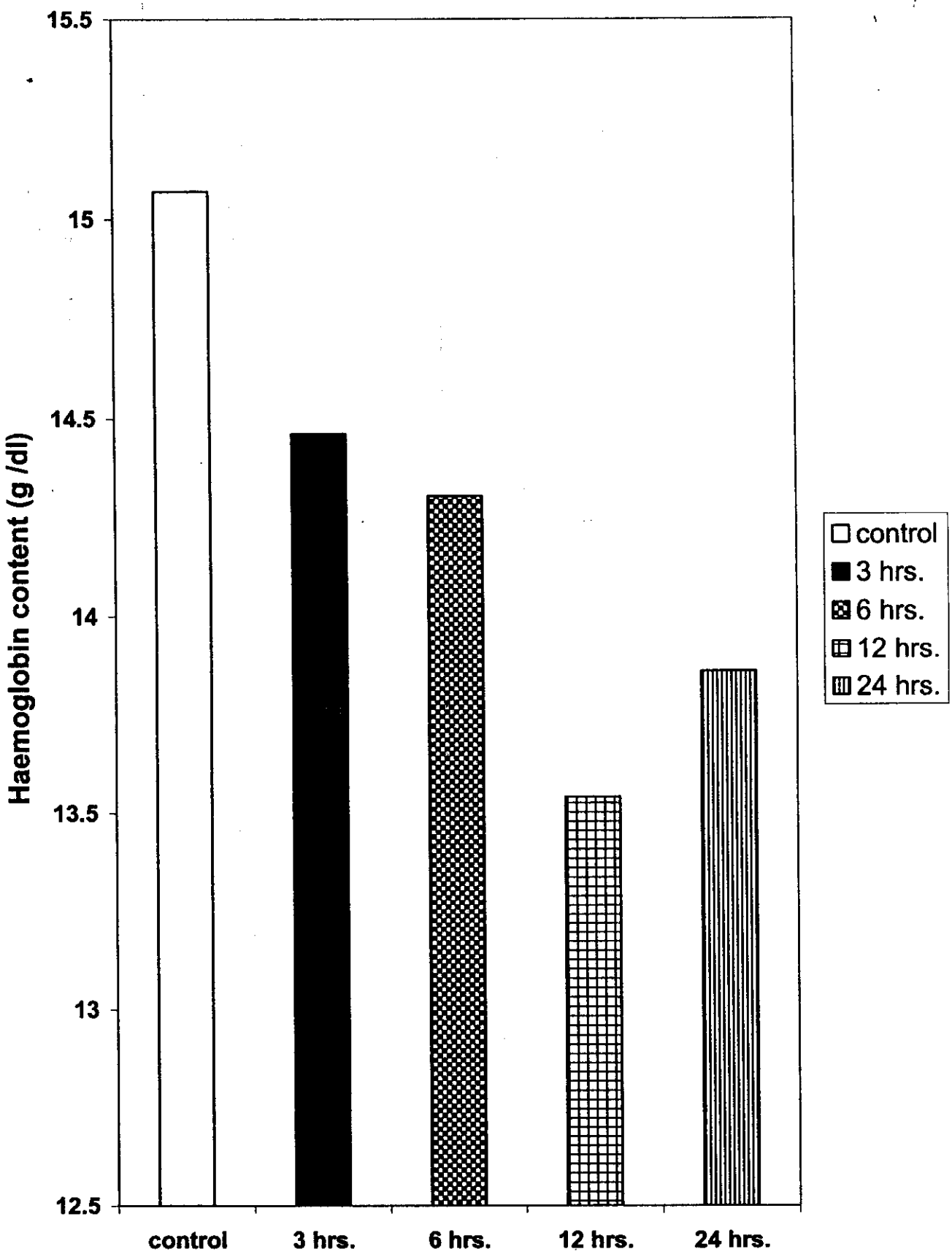

Figure (3) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on haemoglobin content (g/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

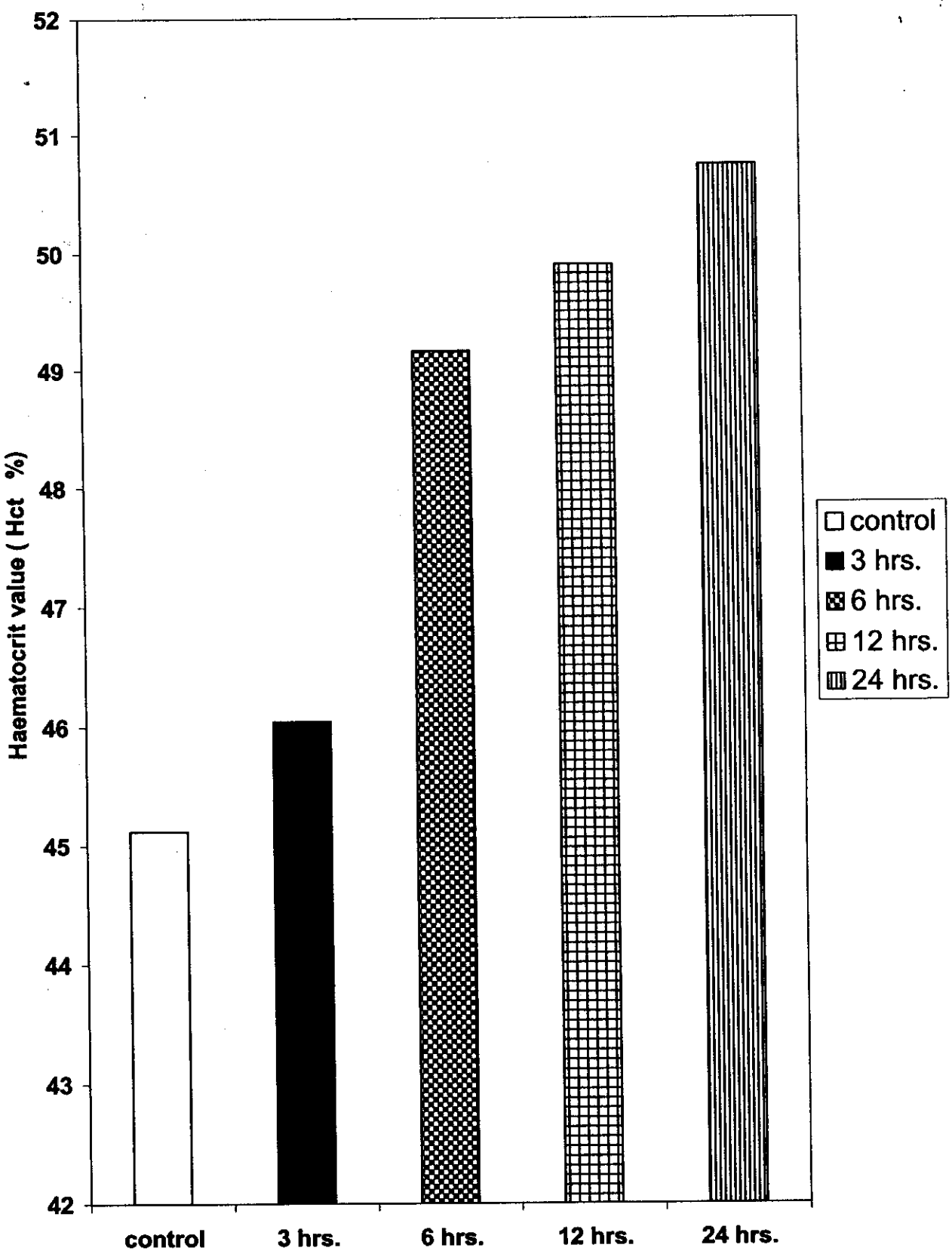

Figure (4) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on haematocrit value (%) of pigeon after 3, 6, 12 and 24 hours of treatment .

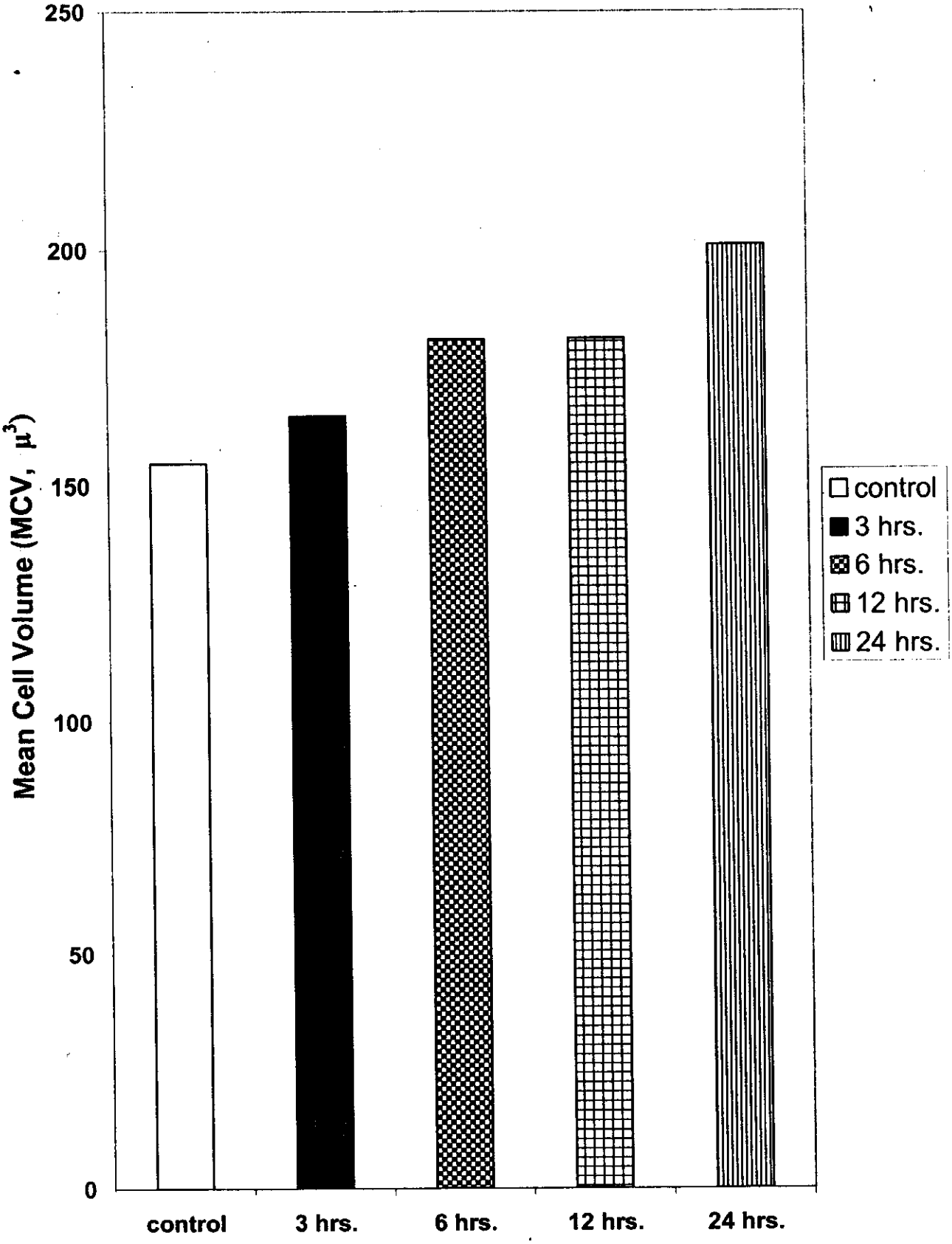

Figure (5) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on mean cell volume (μ^3) of pigeon after 3, 6, 12 and 24 hours of treatment .

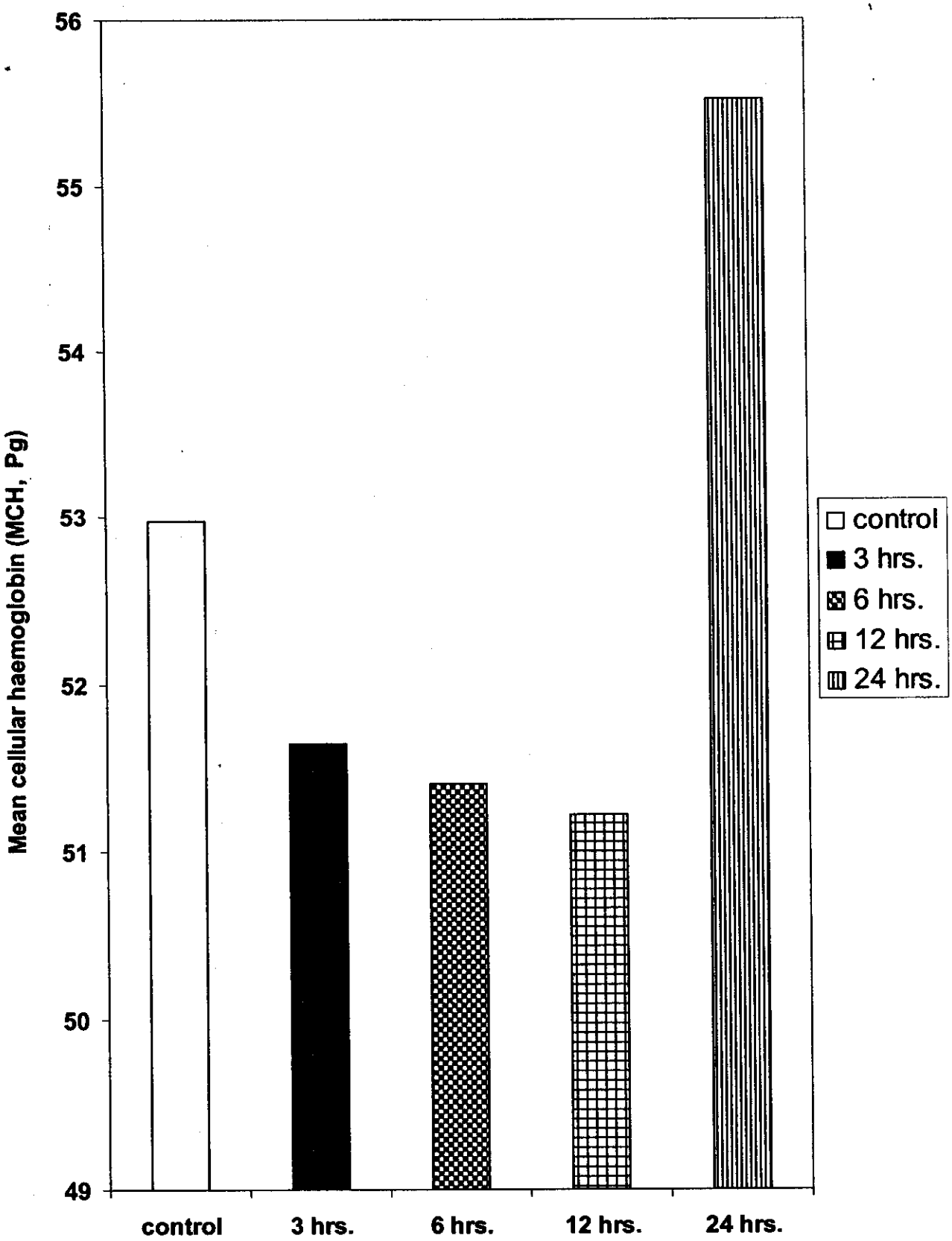

Figure (6) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on mean cellular haemoglobin (Pg) of pigeon after 3, 6, 12 and 24 hours of treatment .

c. Mean cellular haemoglobin concentration (MCHC) :-

The MCHC level showed a non–significant decrease subsequent to 3, 6 and 12 hrs. of propoxur treatment (30.96 %), (29.82 %) , (30.81 %), respectively. However; after 24 hrs.of propoxur treatment the MCH showed a non-significant increase (31.94 %) as compared to that of control value (32.58 %), (Table 1 and Figure 7) .

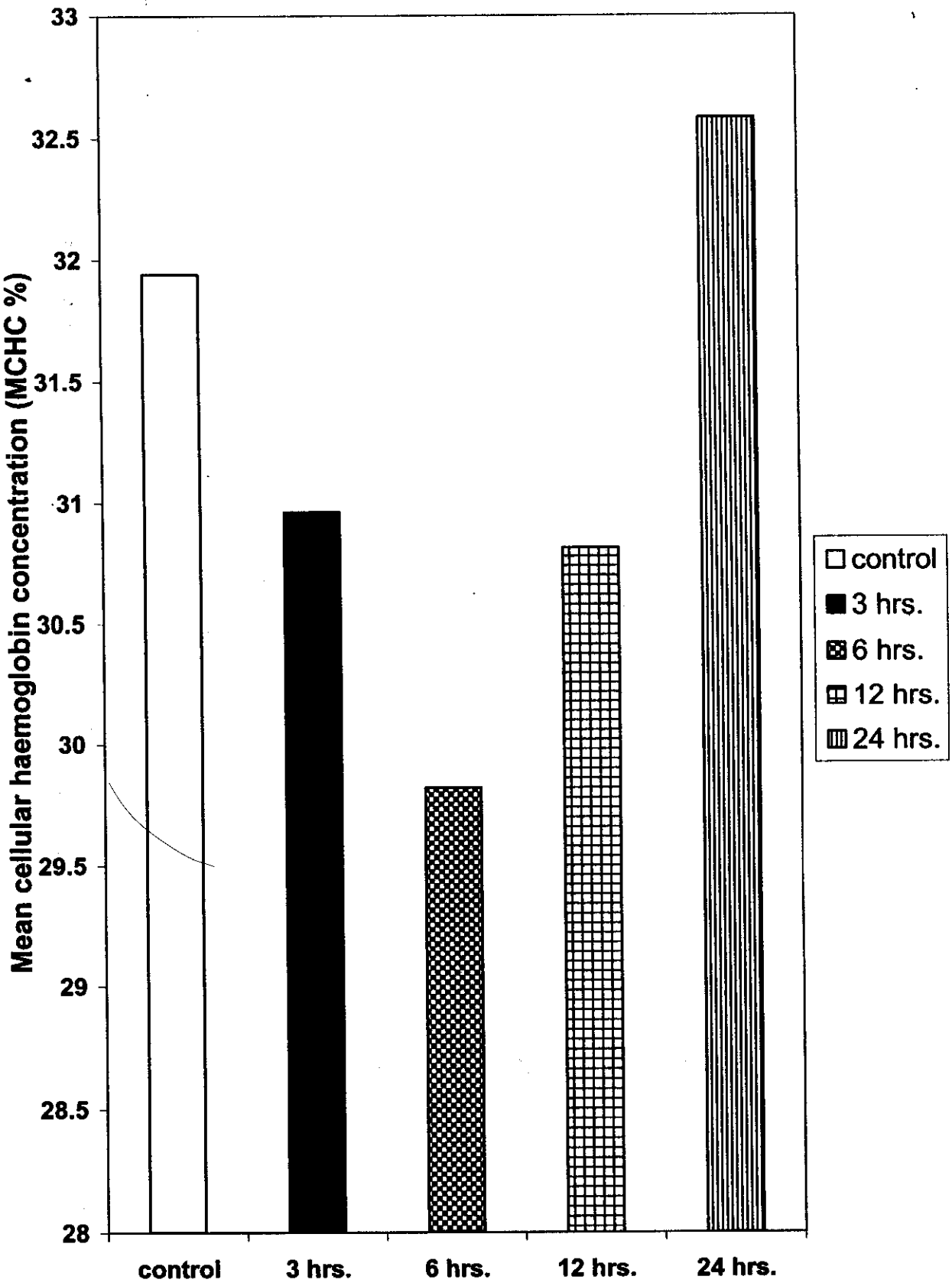

Figure (7) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on mean cellular haemoglobin concentration (%) of pigeon after 3, 6, 12 and 24 hours of treatment .

II. Effect Of A Single Oral Dose (1/2 LD_{50}) Of Propoxur On Respiratory Function Of Blood Of Pigeon.

1. Blood gases :-

Table (2) and figure (8, 9 &10) presented blood gas parameters of blood of pigeon groups after3, 6, 12 and 24 hrs. of treatment with a single oral dose (1/2 LD_{50}) of propoxur compared to control pigeons group.

Arterial, venous and alveolar oxygen partial pressures (P_aO_2, P_vO_2 and P_AO_2, respectively) of blood of pigeons after 3 , 6,12 and 24 hrs.of propoxur treatment were significantly lower than those of control pigeons. The percentage of arterio-venous difference, alveolar- arterial oxygen partial pressure difference and the percentage of venous admixture (% $P_{(a-v)}O_2$, $P_{A-a}O_2$ and % shunt, respectively) were significantly higher than those of control pigeons, except % $P_{(a-v)}$ O_2 which showed insignificant increase 24 hrs. post-treatment (Table 2 & Figure 8) .

Percentage O_2 saturation (% O_2 sat.) of arterial and venous blood at all the experimental periods were significantly lower than that of control pigeons. The percentage of arterio- venous difference of percentage O_2 saturation was significantly high in all the experimental periods as compared to that of control group (Table 2 and Figure 9) .

Arterial, venous and percentage of arterio-venous difference of carbon dioxide partial pressure (P_aCO_2, P_VCO_2 and % $P_{(a-v)}$ CO_2) were significantly high in all the experimental periods compared to those of control pigeons (Table 2 and Fig.10).

Table(2) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on blood gases of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE		*Duration of Experiment (hrs.)*				
		Control	*3*	*6*	*12*	*24*
PO_2 (mmHg)	a	70.17 $^{a'bcde}$ ± 1.58	50.67 $^{a'bcd}$ ± 0.92	44.17 $^{a'bce}$ ± 1.05	43.17 $^{a'bde}$ ± 0.95	48.33 $^{a'cde}$ ± 1.31
	v	46.17 $^{a'bcde}$ ± 2.85	28.17 $^{a'bc}$ ± 1.47	22.08 $^{a'bcde}$ ± 0.70	23.33 $^{a'bde}$ ± 0.99	29.33 $^{a'cde}$ ± 1.12
	% (a-v)	34.44 $^{a'bcd}$ ± 2.83	44.55 $^{a'bc}$ ± 2.05	50.03 $^{a'bce}$ ± 0.66	46.05 $^{a'de}$ ± 1.27	39.32 ^{cde} ± 1.67
	A	121.08 $^{a'bcde}$ ± 1.50	108.79 $^{a'bd}$ ± 1.35	109.00 $^{a'cd}$ ± 2.09	99.00 $^{a'bcde}$ ± 1.48	108.38 $^{a'de}$ ± 1.61
	A-a	50.92 $^{a'bcde}$ ± 0.94	58.12 $^{a'bc}$ ± 0.73	64.83 $^{a'bcde}$ ± 1.28	55.83 $^{a'cde}$ ± 1.04	60.04 $^{a'cde}$ ± 0.73
	%shunt	68.40 $^{a'bcde}$ ± 3.01	73.97 $^{a'b}$ ± 1.92	74.63 $^{a'c}$ ± 0.92	73.85 $^{a'd}$ ± 0.93	76.19 $^{a'e}$ ± 1.69
% O_2 Sat.	a	94.03 $^{a'bcde}$ ± 0.84	83.95 $^{a'be}$ ± 1.37	82.72 $^{a'ce}$ ± 0.43	81.93 $^{a'de}$ ± 0.52	86.67 $^{a'bcde}$ ± 1.07
	v	75.03 $^{a'bcde}$ ± 1.86	42.95 $^{a'be}$ ± 1.74	40.33 $^{a'ce}$ ± 0.49	41.37 $^{a'de}$ ± 0.76	51.40 $^{a'bcde}$ ± 2.33
	% (a-v)	20.26 $^{a'bcde}$ ± 1.27	48.90 $^{a'be}$ ± 1.55	51.24 $^{a'ce}$ ± 0.42	50.32 $^{a'de}$ ± 1.08	40.81 $^{a'bcde}$ ± 1.99
PCO_2 (mmHg)	a	30.33 $^{a'bcde}$ ± 1.20	40.17 $^{a'bd}$ ± 1.08	39.50 $^{a'cd}$ ± 1.80	48.00 $^{a'bcde}$ ± 1.18	40.50 $^{a'de}$ ± 1.29
	v	50.50 $^{a'bcde}$ ± 2.22	60.17 $^{a'bd}$ ± 2.52	60.33 $^{a'cd}$ ± 2.26	71.67 $^{a'bcde}$ ± 2.59	58.67 $^{a'de}$ ± 2.12
	% (a-v)	-66.51 $^{a'bcde}$ ± 3.01	-49.51 $^{a'b}$ ± 2.62	-52.54 $^{a'c}$ ± 3.40	-49.19 $^{a'd}$ ± 2.85	-44.80 $^{a'e}$ ± 1.93

a = arterial blood ,
v = venous blood,
a - v = arterio – venous difference .
A = alveolar blood
A- a = Alveolar – arterial difference.
Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 6 individuals.

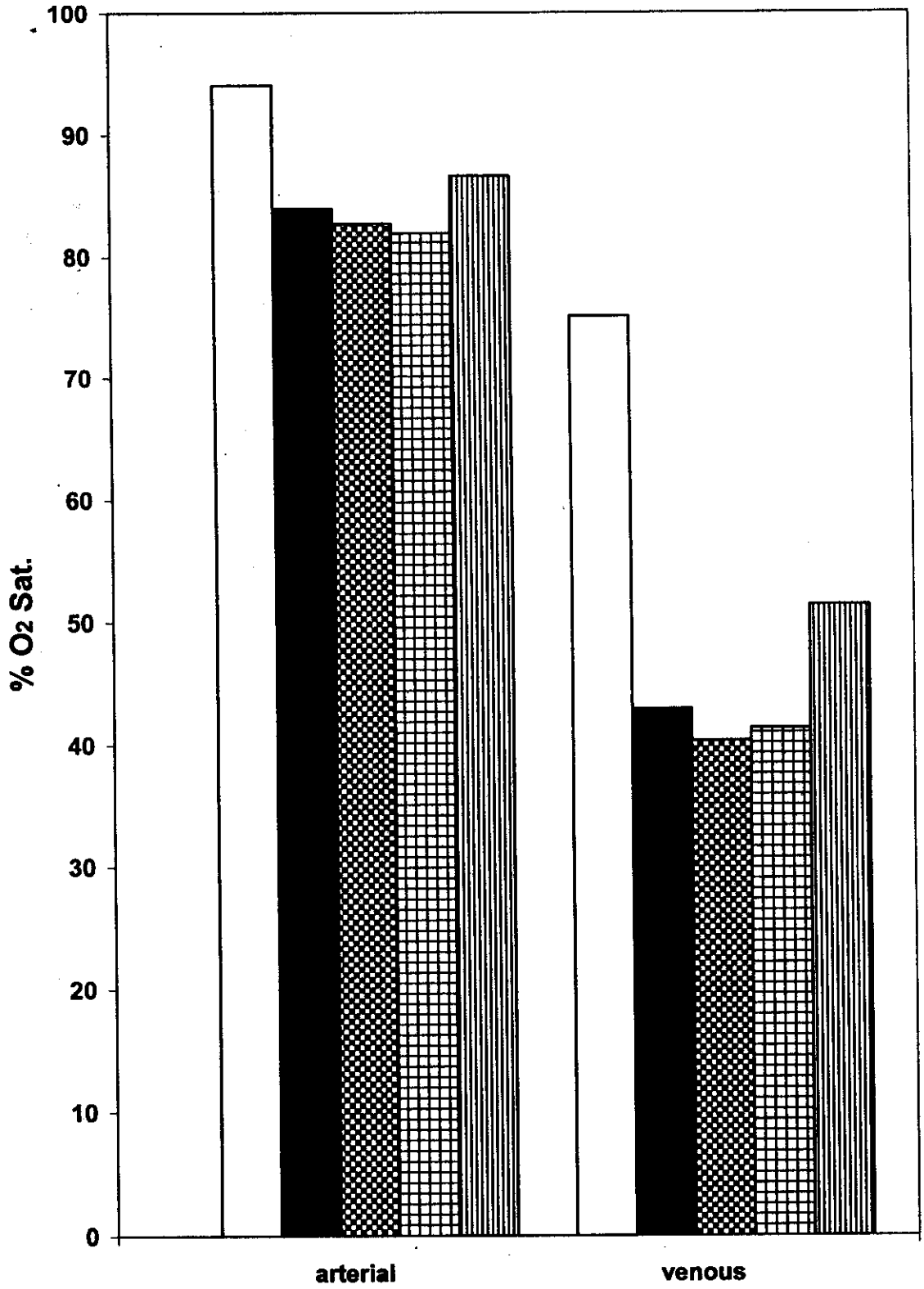

Fig . (9) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on % blood oxygen saturation (% O2 Sat.) of pigeon after 3, 6, 12 and 24 horus of treatment .

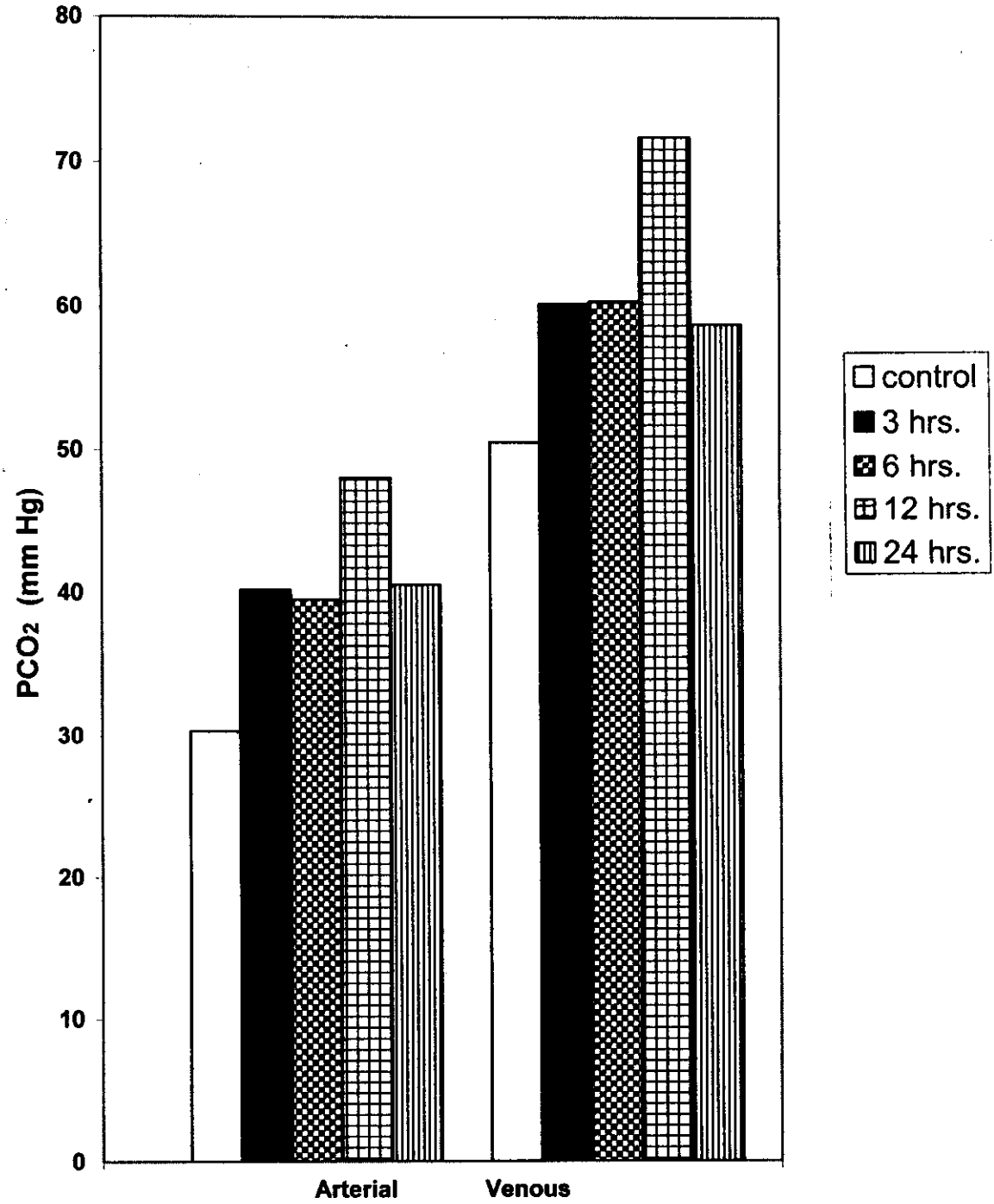

Fig . (10) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on carbon dioxide partial pressure (PCO_2 in mmHg) of blood of pigeon after 3, 6, 12 and 24 horus of treatment.

2. Blood acid – base status : -

Table (3) and fig. (11, 12, 13, 14 and 15) represented blood acid-base status parameters recorded for pigeons treated with a single oral dose (1/2 LD_{50}) after 3, 6, 12 and 24 hrs. of treatment compared to control pigeons.

Arterial and venous blood pH values of pigeons treated with a single oral dose (1/2 LD_{50}) of propoxur at all the experimental periods were significantly lower than that of the control group. The percentage of arterio-venous difference of pH was significantly higher in all the experimental periods than those of control pigeons (Table3 and Figure 11).

Arterial and venous blood bicarbonate (HCO_3^-) concentration values of pigeons after 3, 6 and 12 hrs. of treatment were significantly lower compared to control group, while that of pigeons after 24 hrs. of treatment was non-significantly lower than those of control pigeons (Table 3 and Figure 12) .

The percentage of arterio- venous difference of bicarbonate (HCO_3^-) concentration was decreased significantly in pigeons after 3 hrs. of treatment compared to that of control one. It was non-significantly decreased after 12 hrs., while that of 24 hrs. post- treatment was increased significantly compared to that of control pigeons.

Arterial and venous blood total carbon dioxide (TCO_2) of pigeons 3, 6 and 12 hrs. post-treatment were significantly low compared to those of control group, while those obtained after 24 hrs. of treatment were non-significantly lower than those of control group. The percentage of arterio-venous difference of total carbon dioxide was significantly decreased 6 hrs. and

Table (3) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on acid-base status parameters of blood of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE		*Duration of Experiment (hrs.)*				
		Control	*3*	*6*	*12*	*24*
pH (Unit)	a	7.45 $^{a'bcde}$ ± 0.01	7.30 $^{a'bc}$ ± 0.01	7.26 $^{a'cc}$ ± 0.01	7.28 $^{a'de}$ ± 0.01	7.34 $^{a'bcde}$ ± 0.01
	v	7.34 $^{a'bcde}$ ± 0.01	7.12 $^{a'bc}$ ± 0.02	7.07 $^{a'bcc}$ ± 0.02	7.08 $^{a'de}$ ± 0.01	7.14 $^{a'cde}$ ± 0.02
	% (a-v)	1.48 $^{a'bcde}$ ± 0.07	2.47 $^{a'bcc}$ ± 0.1	2.73 $^{a'bc}$ ± 0.08	2.66 $^{a'd}$ ± 0.09	2.82 $^{a'be}$ ± 0.11
(HCO_3^-) (mM/L)	a	26.77 $^{a'bcd}$ ± 0.54	18.78 $^{a'be}$ ± 1.06	20.48 $^{a'ce}$ ± 1.13	21.90 $^{a'de}$ ± 1.17	26.18 ^{bcde} ± 1.33
	v	29.05 $^{a'bcd}$ ± 1.91	20.70 $^{a'bde}$ ± 0.68	22.22 $^{a'ce}$ ± 0.60	25.25 $^{a'bd}$ ± 0.70	28.17 ^{bce} ± 1.16
	% (a-v)	-10.75 $^{a'be}$ ± 0.63	-15.03 $^{a'bce}$ ± 0.29	-10.25 ^{be} ± 0.67	-12.60 ^{de} ± 0.68	-7.87 $^{a'bde}$ ± 1.55
TCO_2 (mM/L)	a	30.03 $^{a'bcd}$ ± 0.43	21.92 $^{a'bde}$ ± 1.12	24.35 $^{a'ce}$ ± 0.80	25.68 $^{a'bde}$ ± 1.45	29.77 ^{bcde} ± 0.97
	v	32.57 $^{a'bcd}$ ± 1.30	23.37 $^{a''bcde}$ ± 0.95	27.33 $^{a'bce}$ ± 1.10	27.33 $^{a'bde}$ ± 1.18	31.00 ^{bcde} ± 0.80
	% (a-v)	-9.39 $^{a'ce}$ ± 0.55	-10.27 ^{be} ± 1.64	-12.44 $^{a'cde}$ ± 1.00	-8.53 ^{cde} ± 0.55	-5.38 $^{a'bcde}$ ± 0.53
BE. (mM/L)	a	1.53 $^{a'bcd}$ ± 1.19	-4.77 $^{a'be}$ ± 0.77	-7.60 $^{a'cde}$ ± 0.40	-4.20 $^{a'cde}$ ± 1.06	1.07 ^{bcde} ± 1.67
	v	-3.90 $^{a'bc}$ ± 0.57	-11.17 $^{a'bde}$ ± 0.84	-9.78 $^{a'cde}$ ± 0.59	-4.95 ^{bcd} ± 0.41	-3.07 ^{bce} ± 2.00
	% (a-v)	144.97 $^{a'bcde}$ ± 21.42	-145.97 $^{a'bcde}$ ± 9.28	-28.88 $^{a'bcde}$ ± 3.89	-89.70 ^{abcde} ± 14.82	11.27 ^{abcde} ± 1.61
$\frac{(HCO_3^-)}{\alpha\ PCO_2}$	a	29.81 $^{a'bcde}$ ± 1.77	15.68 $^{a'be}$ ± 1.07	17.43 $^{a'ce}$ ± 1.08	16.36 $^{a'de}$ ± 0.68	21.81 $^{a'bcde}$ ± 1.74
	v	19.63 $^{a'bcd}$ ± 2.16	12.00 $^{a'be}$ ± 0.72	12.40 $^{a'ce}$ ± 0.73	11.88 $^{a'de}$ ± 0.74	16.19 ^{bcde} ± 1.12
	% (a-v)	43.69 $^{a'bcde}$ ± 1.44	35.35 $^{a'bd}$ ± 1.56	29.68 $^{a'c}$ ± 2.88	22.78 $^{a'bd}$ ± 3.79	29.88 $^{a'e}$ ± 2.62
$\frac{Log\ PCO2}{pH}$	a	0.20 $^{a'bcde}$ ± 0.004	0.22 $^{a'bd}$ ± 0.003	0.22 $^{a'cd}$ ± 0.003	0.23 $^{a'bcde}$ ± 0.004	0.22 $^{a'de}$ ± 0.003
	v	0.23 $^{a'bcde}$ ± 0.003	0.25 $^{a'bd}$ ± 0.004	0.25 $^{a'cd}$ ± 0.003	0.26 $^{a'bcde}$ ± 0.003	0.25 $^{a'de}$ ± 0.003
	% (a - v)	-17.75 $^{a'bc}$ ± 1.2	-14.66 $^{a'b}$ ± 0.72	-15.20 ± 0.79	-13.38 $^{a'c}$ ± 0.54	-15.48 ± 1.52

a = arterial blood,
v = venous blood,
a - v = arterio – venous difference .
Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 6 individuals.

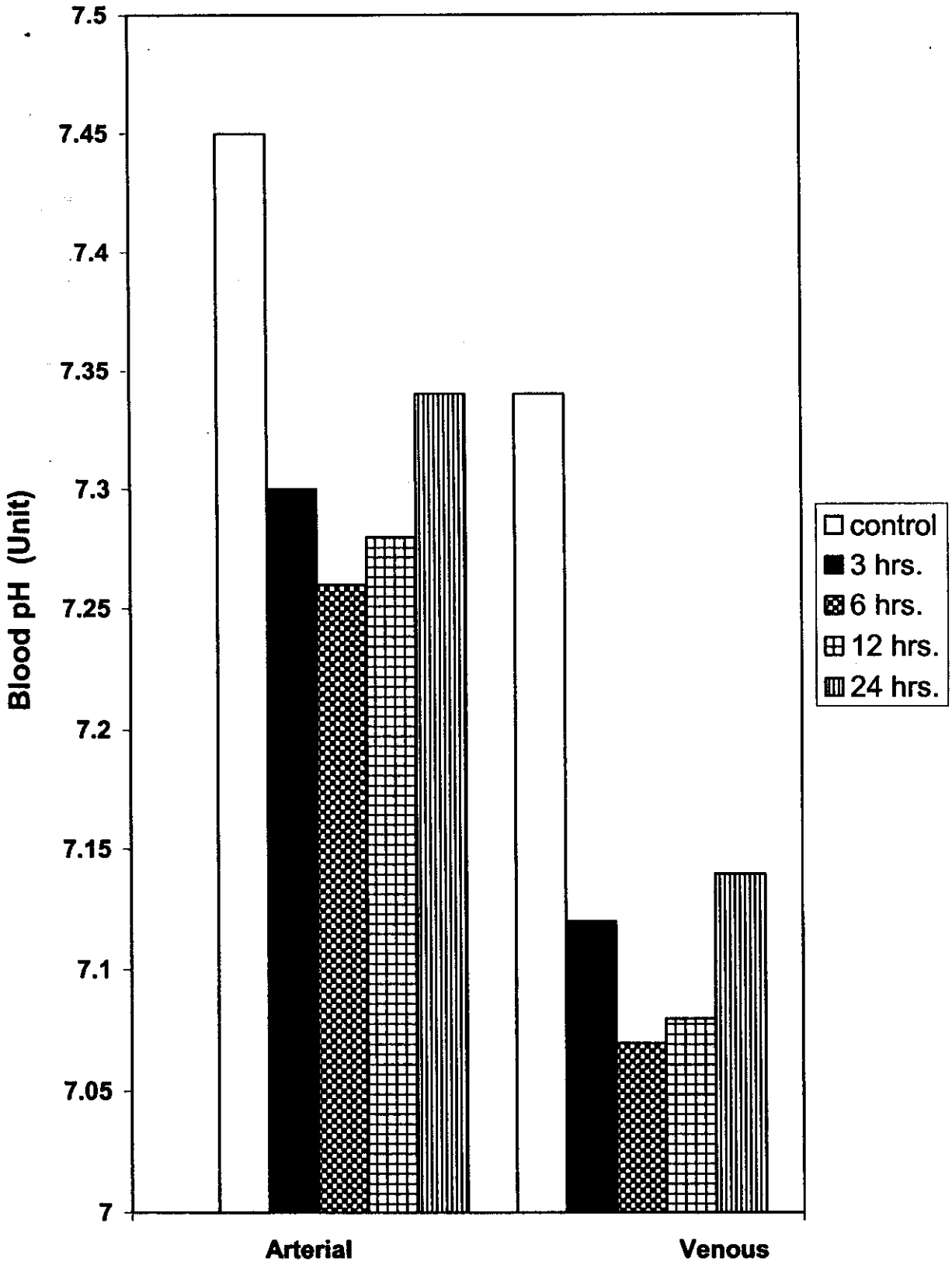

Fig . (11) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on the pH values (Unit) of blood of pigeon after 3, 6, 12 and 24 hours of treatment .

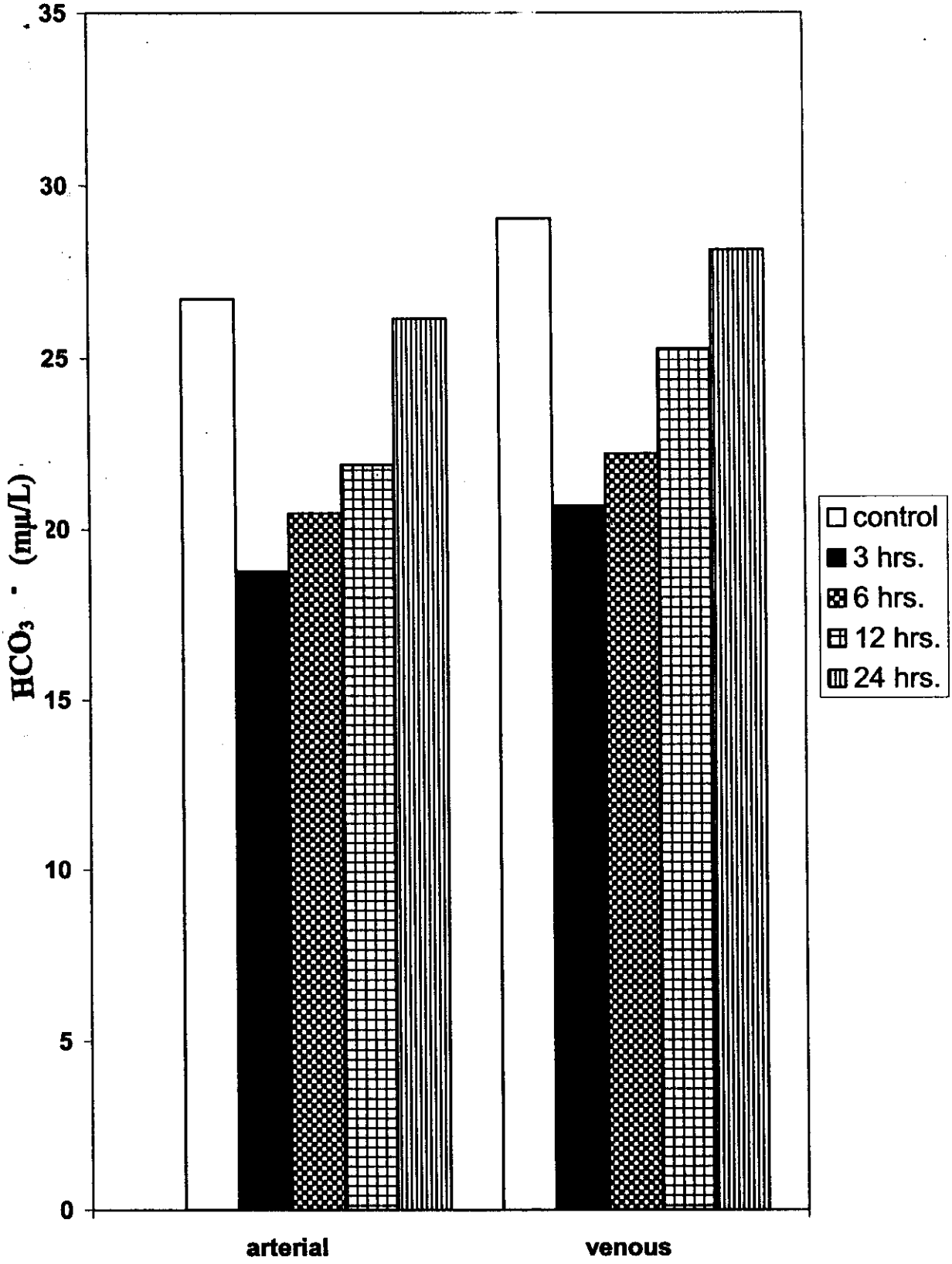

Fig. (12) : Effect of a single oral (1/2 LD_{50}) of propoxur on bicarbonate concentration (HCO_3^-) of blood (mμ/L) of pigeon after 3, 6, 12 and 24 hours of treatment .

increased significantly 24 hrs. post-treatment compared to that of the control pigeons (Table 3 and Figure 13).

Arterial blood base excess (BE) values of pigeons 3, 6 and 12 hrs. post –treatment were significantly decreased compared to that of control group, while that of arterial blood post 24 hrs. and those of venous blood post 12 and 24 hrs. of treatment were non-significantly changed compared to that of control pigeons group. The percentage arterio- venous difference of base excess at all the experimental periods were significantly decreased compared to that of the control pigeons group (Table 3 and Figure 14).

The calculated $HCO_3^-/\alpha\ PCO_2$ ratio of the arterial and venous blood and percentage of arterio-venous difference were decreased significantly at the different experimental periods compared to values of the control group (Table 3 and Figure 15).

On the other hand, calculated buffer values (log PCO_2/pH) of arterial and venous blood of treated pigeons at all of the experimental periods were increased significantly compared to that of the control pigeons group.

3. Blood oxygen equilibrium curve (OEC):-

The blood oxygen equilibrium curves (OEC) of pigeon groups 3, 6, 12 and 24 hrs. post-treatment with a single oral dose (1/2 LD_{50}) of propoxur were found to be shifted to the right in relation to that of the control pigeons group (Fig.16). The blood oxygen half saturation pressure (P_{50}) as a measure of blood oxygen affinity found to be 28.5, 34, 35, 36, and 32 for control, 3, 6, 12 and 24 hrs. after treatment, respectively with significant differences at $p < 0.05$ (Table 4). Hill's constant (n value in Hill's equation) was found to be 2.50, 2.80, 2.67, 2.89 and 3.75 for control, 3, 6, 12 and 24 hrs. after treatment, respectively (Table 4 & Figure 17).

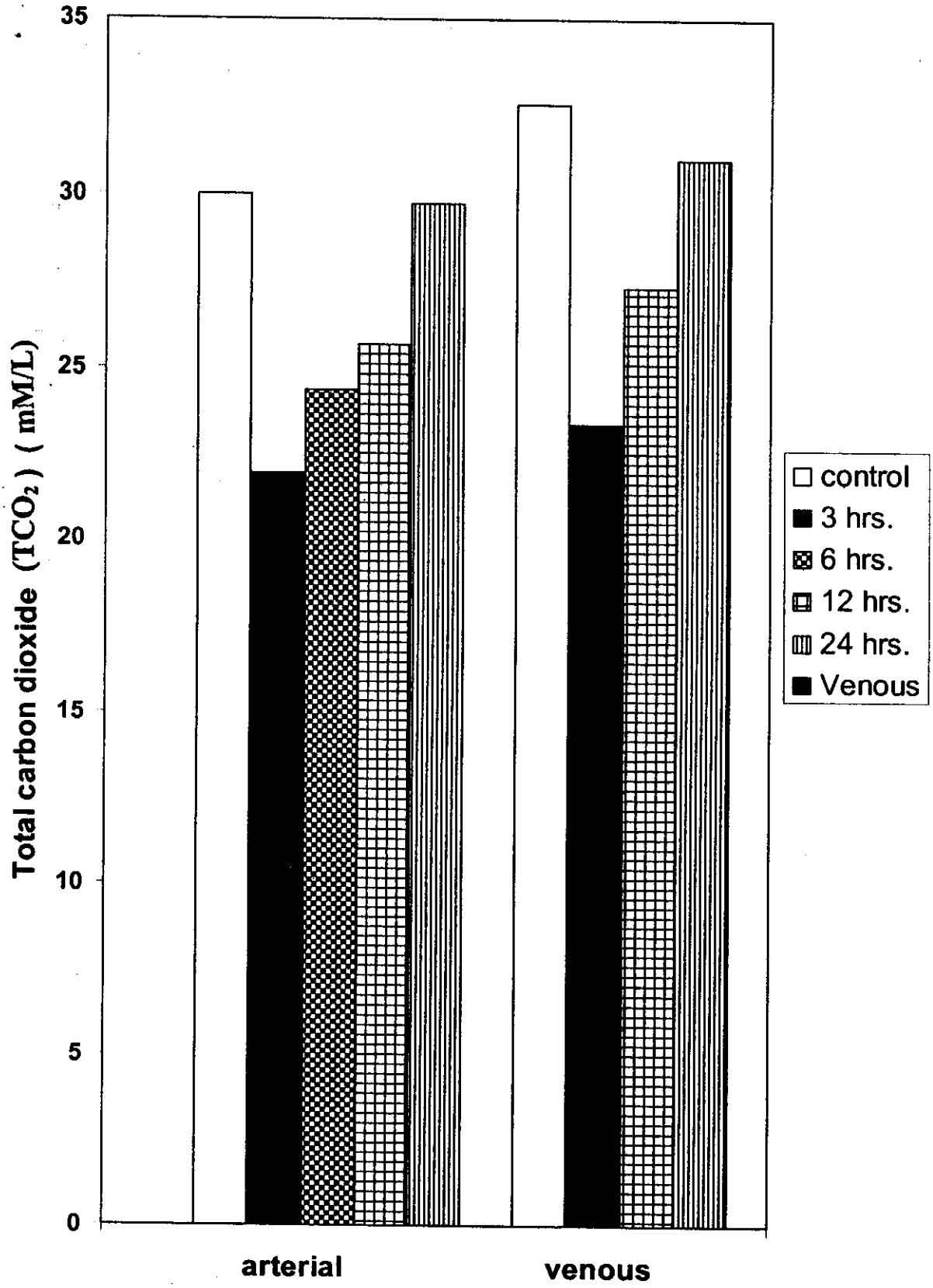

Fig . (13) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on blood total carbon dioxide (TCO_2 in mM/L) of pigeons after 3, 6, 12 and 24 horus of treatment.

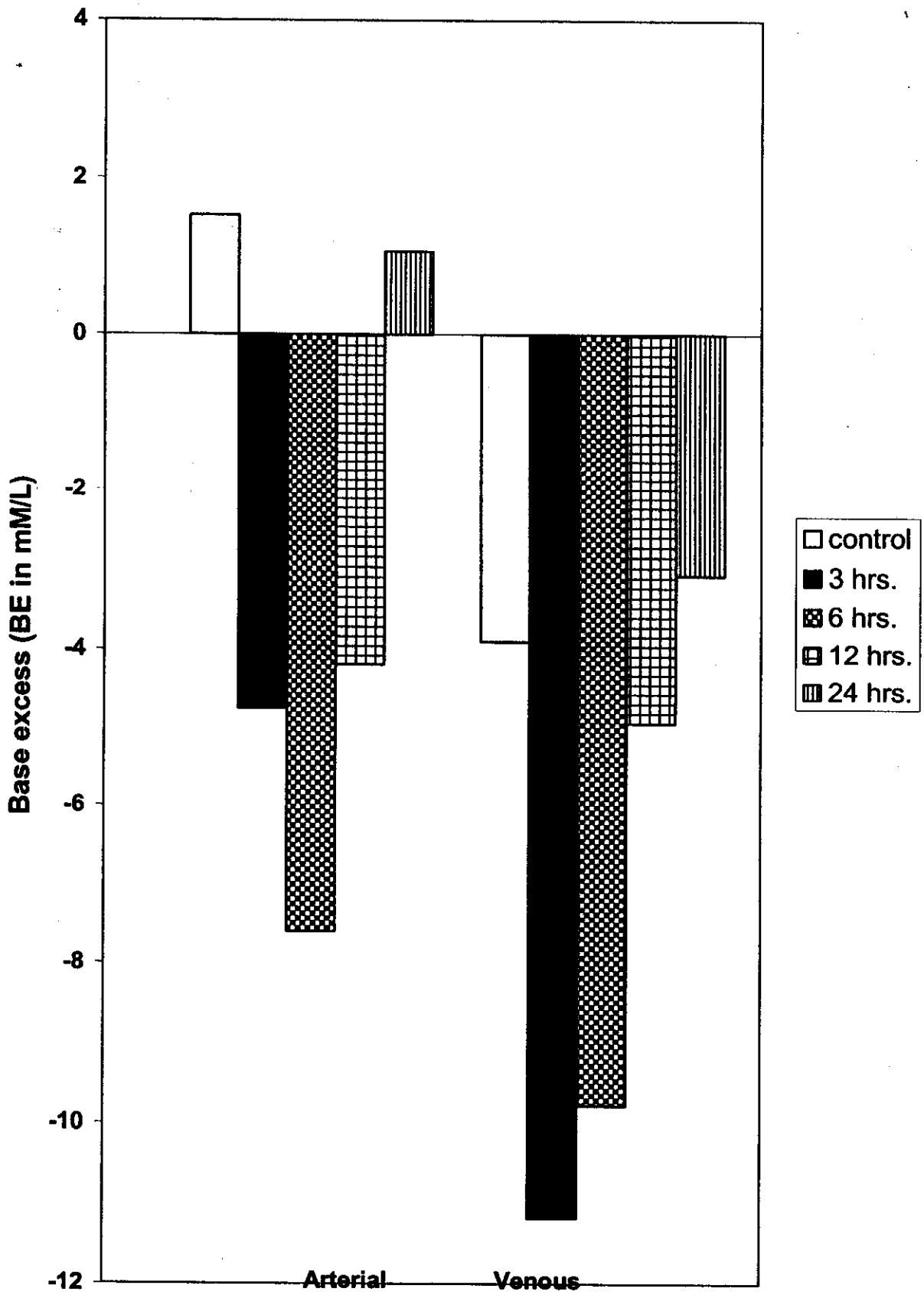

Fig . (14) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on blood base excess (BE in mM/L) of pigeon after 3, 6, 12 and 24 hours of treatment .

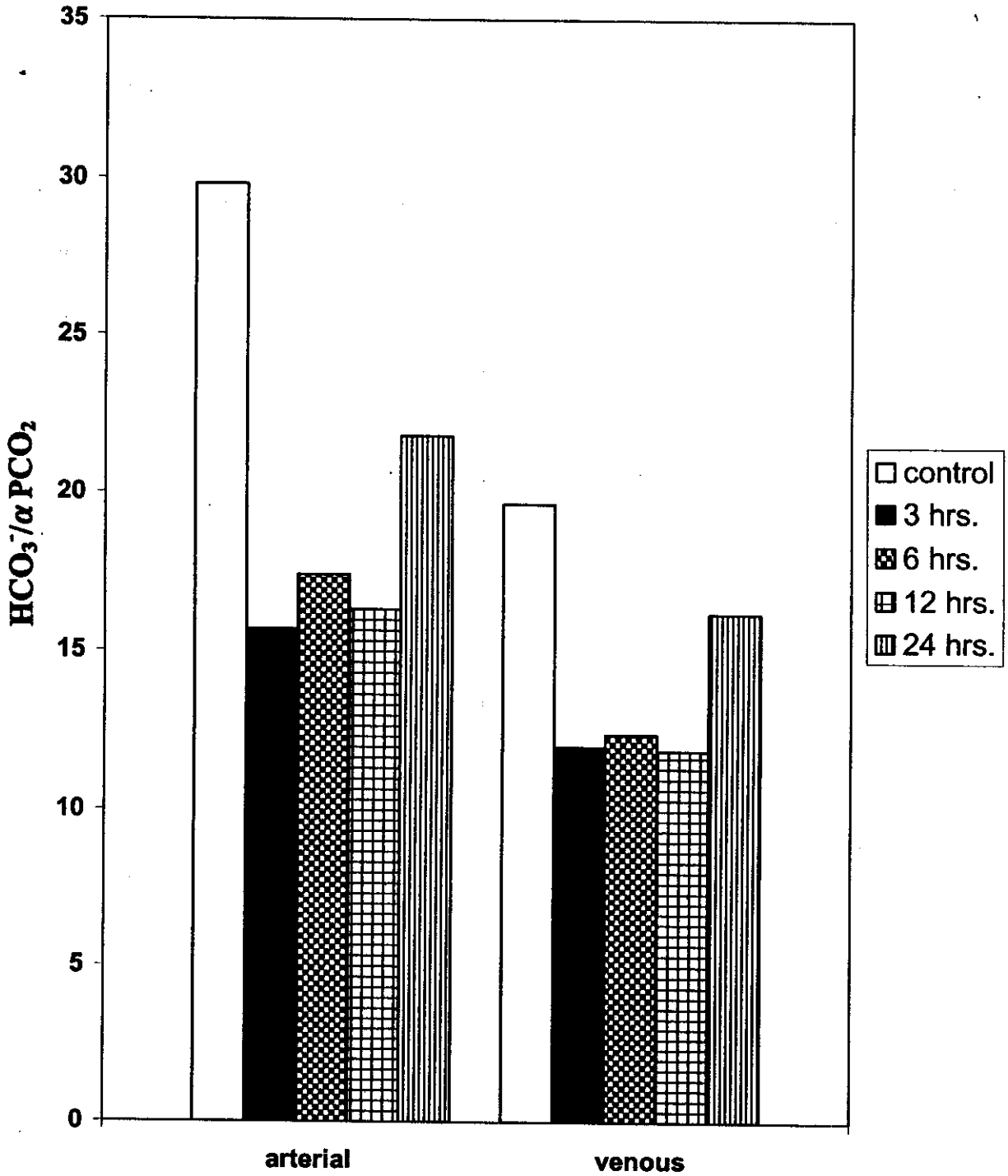

Fig . (15) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on blood $HCO_3^-/\alpha PCO_2$ of blood of pigeons after 3, 6, 12 and 24 horus of treatment .

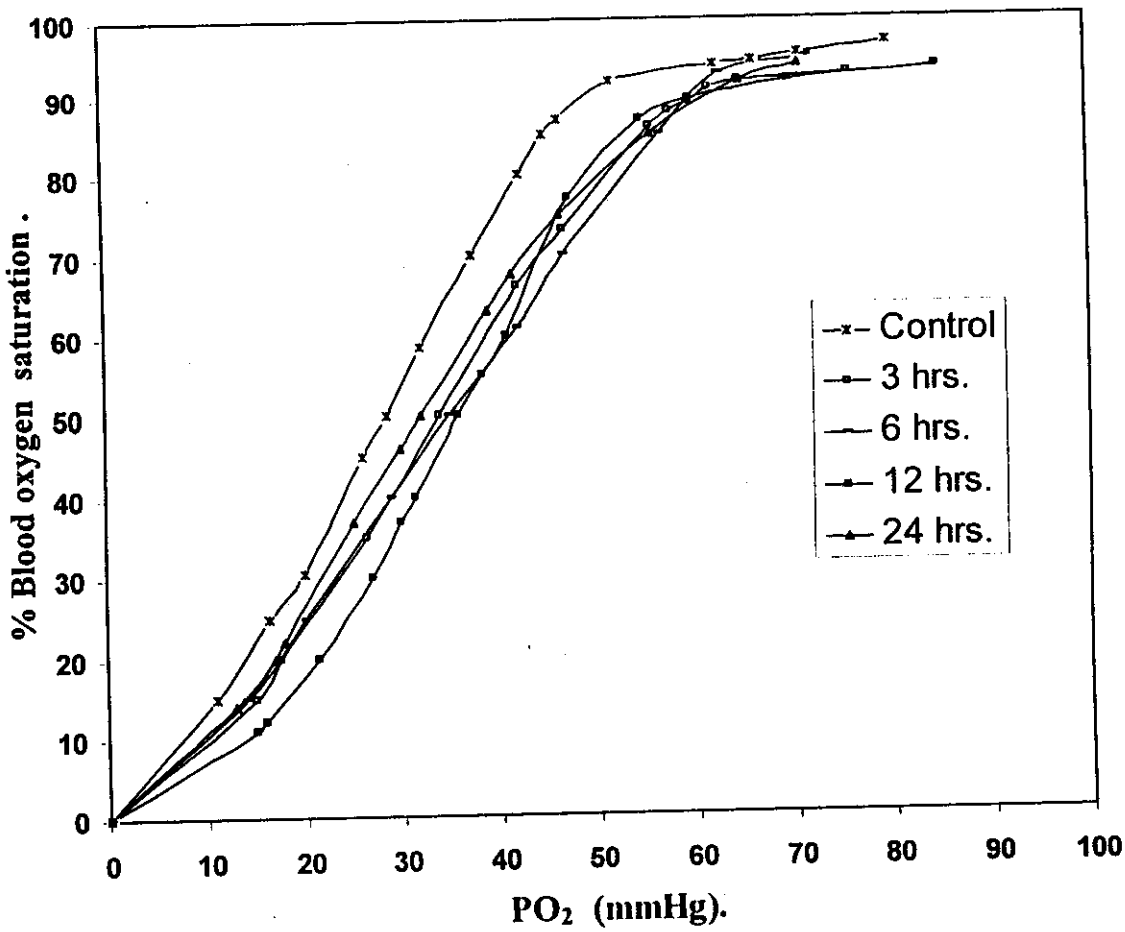

Fig .(16): Blood oxygen equilibrium curve of pigeon (*Columba livia domestica*) treated with a single oral dose (1/2 LD_{50}) of propoxur after 3, 6, 12 and 24 hours of treatment.

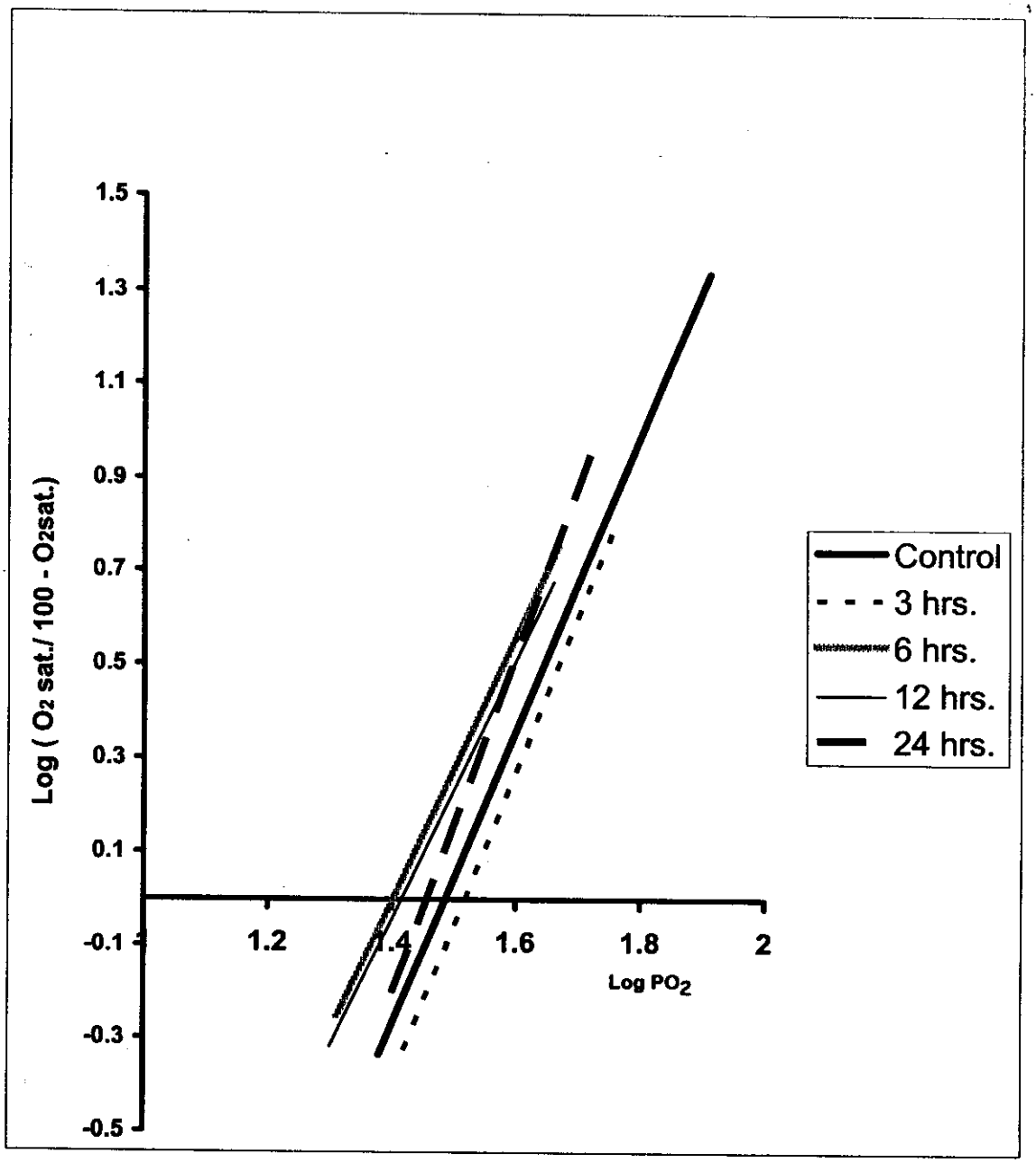

Fig. (17) : Hill's plot of pigeon (*Columba livia domestica*) treated with a single oral dose (1/2 LD_{50}) of propoxur after 3, 6, 12 and 24 hours of treatment .

Table (4) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on blood oxygen half saturation pressure (P_{50}) and Hill's constant (n value) of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE	*Duration of Experiment (hrs.)*				
	Control	*3*	*6*	*12*	*24*
P_{50} (mm Hg)	28.50^{abcde} ± 0.33	34.35^{abde} ± 0.27	35.00^{acde} ± 0.37	36.00^{abcde} ± 0.36	32.00^{abcde} ± 0.29
n	2.50^{abde} ± 0.03	2.80^{abe} ± 0.06	2.67^{cde} ± 0.08	2.89^{acde} ± 0.06	3.75^{abcde} ± 0.07

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 6 individuals.

III . Effect of a Single Oral Dose (1/2 LD_{50}) of Propoxur on some Metabolites and Enzymes

1) Serum Glucose Concentration : -

The effects of a single oral dose (1/2 LD_{50}) of propoxur (after 3, 6, 12, and 24 hrs. of treatment) on serum glucose concentration are shown in table (5) and figure (18). Non-significant changes were observed in serum glucose concentration of control group (295.80 mg/dl) after propoxur administration by 3 hrs. (277 mg /dl) and 6 hrs. (307.2 mg/dl), while those recorded after of 12 hrs. (323 mg/dl) and 24 hrs. (336.80 mg/dl) were significantly increased compared to that of control (295.80 mg/dl) .

2) Serum Proteins : -

a. Serum Total Protein Concentration : -

The present work showed that total serum protein concentration of the pigeons decreased subsequent to 3, 6, 12 and 24 hrs. (2.74 g/dl, 2.12 g/dl, 2.30 g/dl and 2.82 g/dl), respectively (Table 5 and Figure 19). These decreases were significant after 6 hrs. (2.12 g/dl) and 12 hrs. (2.30 g/dl) of treatment as compared to that of the control birds (2.84 g/dl).

b. Serum Albumin Concentration : -

There were non - significant changes in serum albumin content of pigeons treated with (1/2 LD_{50}) of the propoxur. The mean values of the different experimental groups were 1.32, 1.18, 1.22 and 1.26 g/dl after 3, 6, 12 and 24 hrs. of treatment , respectively while that of control pigeons was 1.3 g/dl (Table 5 and Figure 20).

c. Serum Globulins Concentration : -

The data shown in table (5) and figure (21) indicated a significant decrease in the serum globulins Concentration after 6 hrs. (0.94 g/dl) and 12 hrs. (1.08

Table (5) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum metabolites of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE	*Duration of Experiment (hrs.)*				
	Control	*3*	*6*	*12*	*24*
Glucose (mg/dl)	295.80 ^{ade} ± 7.14	277.00 ^{bcde} ± 4.81	307.20 ^{bce} ± 12.27	323.0 ^{abd} ± 8.54	336.80 ^{abce} ± 6.35
Total protein (g/dl)	2.84 ^{acd} ± 0.16	2.74 ^{bcd} ± 0.15	2.12 ^{abce} ± 0.12	2.30 ^{abde} ± 0.11	2.82 ^{cde} ± 0.06
Albumin (g/dl)	1.30 ± 0.05	1.32 ^{ab} ± 0.06	1.18 ^{ab} ± 0.04	1.22± 0.02	1.26± 0.04
Globulins (g/dl)	1.54 ^{acd} ± 0.16	1.42 ^{bcd} ± 0.10	0.94 ^{abce} ± 0.09	1.08 ^{abde} ± 0.09	1.56 ^{cde} ± 0.08
A / G (ratio)	0.88 ^{acd} ± 0.09	0.94 ^{bc} ± 0.04	1.30 ^{abce} ± 0.12	1.15 ^{ade} ± 0.07	0.82 ^{cde} ± 0.06
Total lipids (mg/dl)	1185.00 ^{abcd} ± 47.20	1000.80 ^{abe} ± 25.84	1008.82 ^{ace} ± 26.52	1059.98 ^{ade} ± 36.10	1158.87 ^{bcde} ± 17.85
Triglycerides (mg/dl)	248.72 ^{ad} ± 4.56	257.07 ± 18.72	235.00 ^{bd} ± 13.56	214.20 ^{cd} ± 9.82	299.46 ^{abcd} ± 22.56
Cholesterol (mg/dl)	248.69 ^{abc} ± 6.01	323.01 ^{abde} ± 23.69	324.68 ^{acde} ± 8.30	264.21 ^{bcd} ± 15.09	245.78 ^{bce} ± 10.66

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

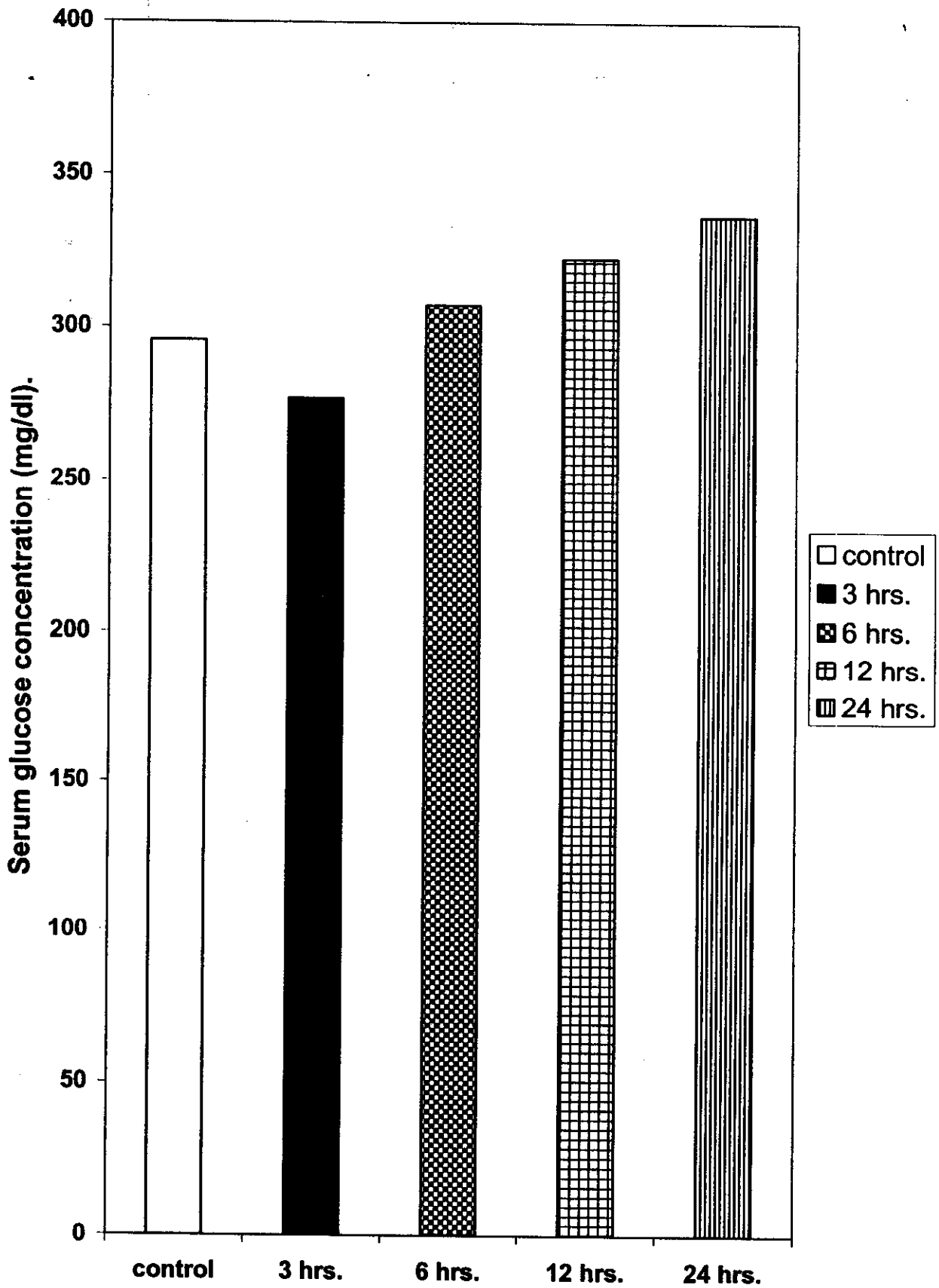

Fig. (18) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum glucose concentration (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

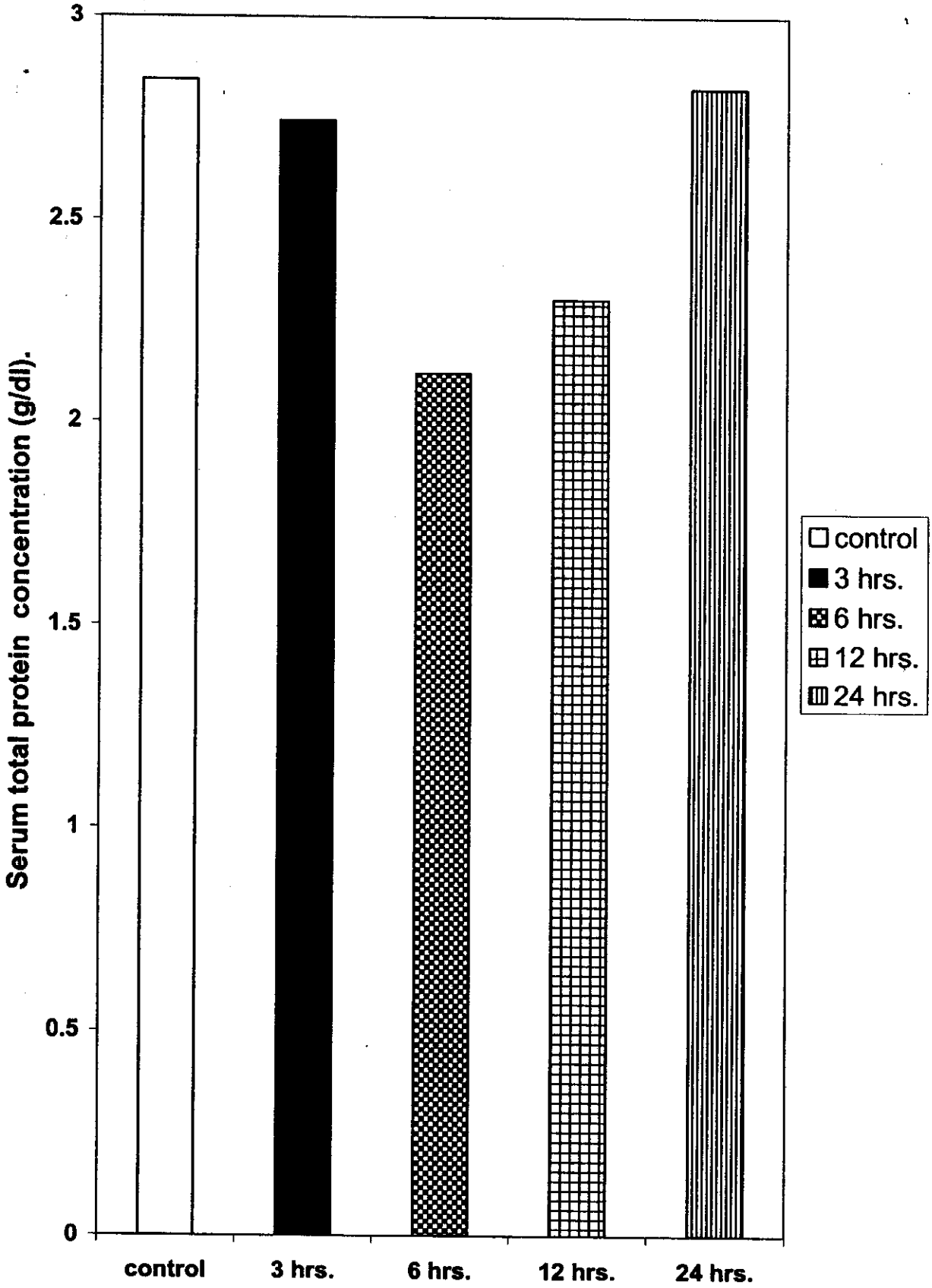

Fig. (19) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum total protein concentration (g /dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

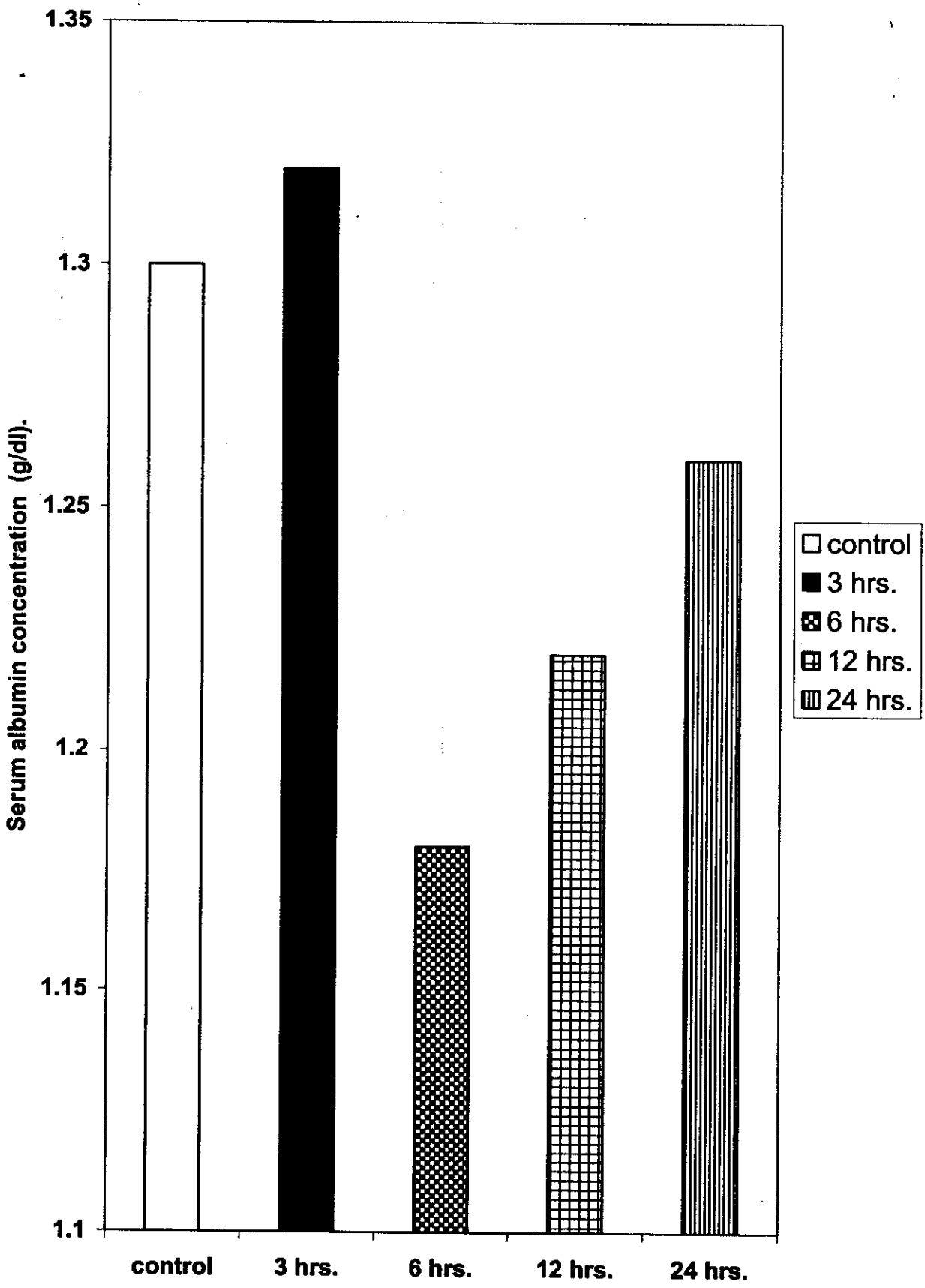

Fig. (20) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum albumin concentration (g/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

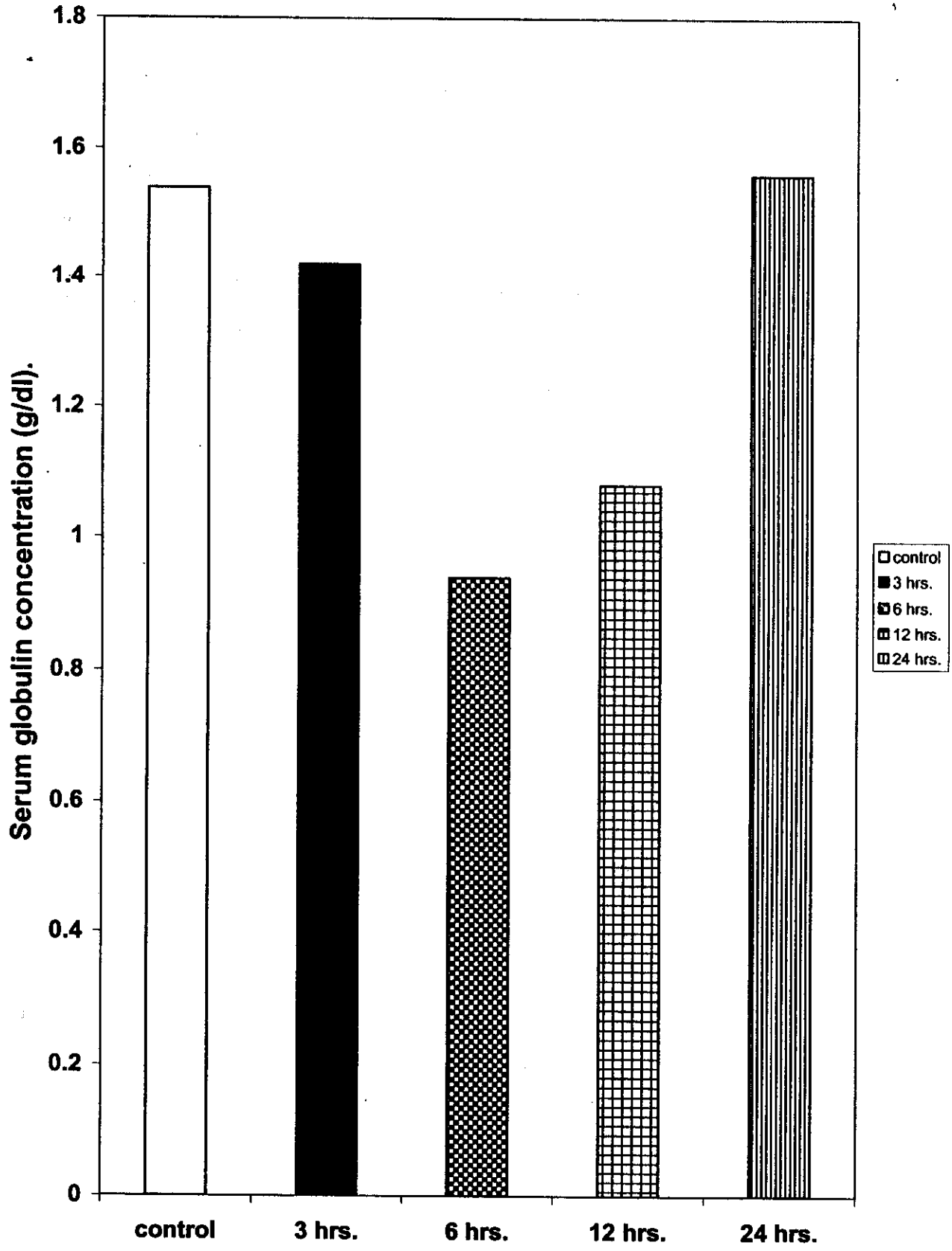

Fig. (21) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum globulin concentration (g /dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

g/dl) of propoxur treatment as compared to that of the control group (1.54 g/dl), while those obtained after 3 hrs. (1.42 g/dl) and 24 hrs. (1.56 g/dl) were non-significantly changed .

d . Albumin / Globulins Ratio (A/G) :-

The data obtained are present in table (5) and demonstrated by figure (22). Significant increases in the A/G ratio were noticed at 6 hrs. (1.30) and 12 hrs. (1.15) post-treatment. Unaltered A/G ratio was noticed at 3 hrs. (0.94) and 24 hrs.(0.82) post- treatment as compared to those of the control group (0.88).

3) Serum Total Lipids Concentration:-

Data of Serum total lipids concentration of all experimental groups are presented in table (5) and figure (23). Serum total lipids concentration decreased significantly in pigeons after administration of a single oral dose (1/2 LD_{50}) of propoxur at 3 hrs. (1000,80 mg/dl) , 6 hrs. (1008.82 mg/dl) and 12 hrs. (1059.98 mg/dl) as compared to those of the control group (1185 mg/dl), while that of 24 hrs. (1158.87 mg/dl) was non-significantly changed

4) Serum Triglycerides Content :-

The effect of a single oral dose (1/2 LD_{50}) of propoxur on serum triglycerides content of pigeons compared to that of the control pigeons group is presented in table (5) and figure (24). Non-significant changes in serum triglycerides content were observed in treated groups after 3 hrs. (257.07 mg/dl), 6 hrs. (235 mg/dl), and 12 hrs.(214.20 mg/dl), while significant increase was noticed 24 hrs. (299.46 mg/dl) post-treatment when compared with control pigeons group (248.72 mg/dl).

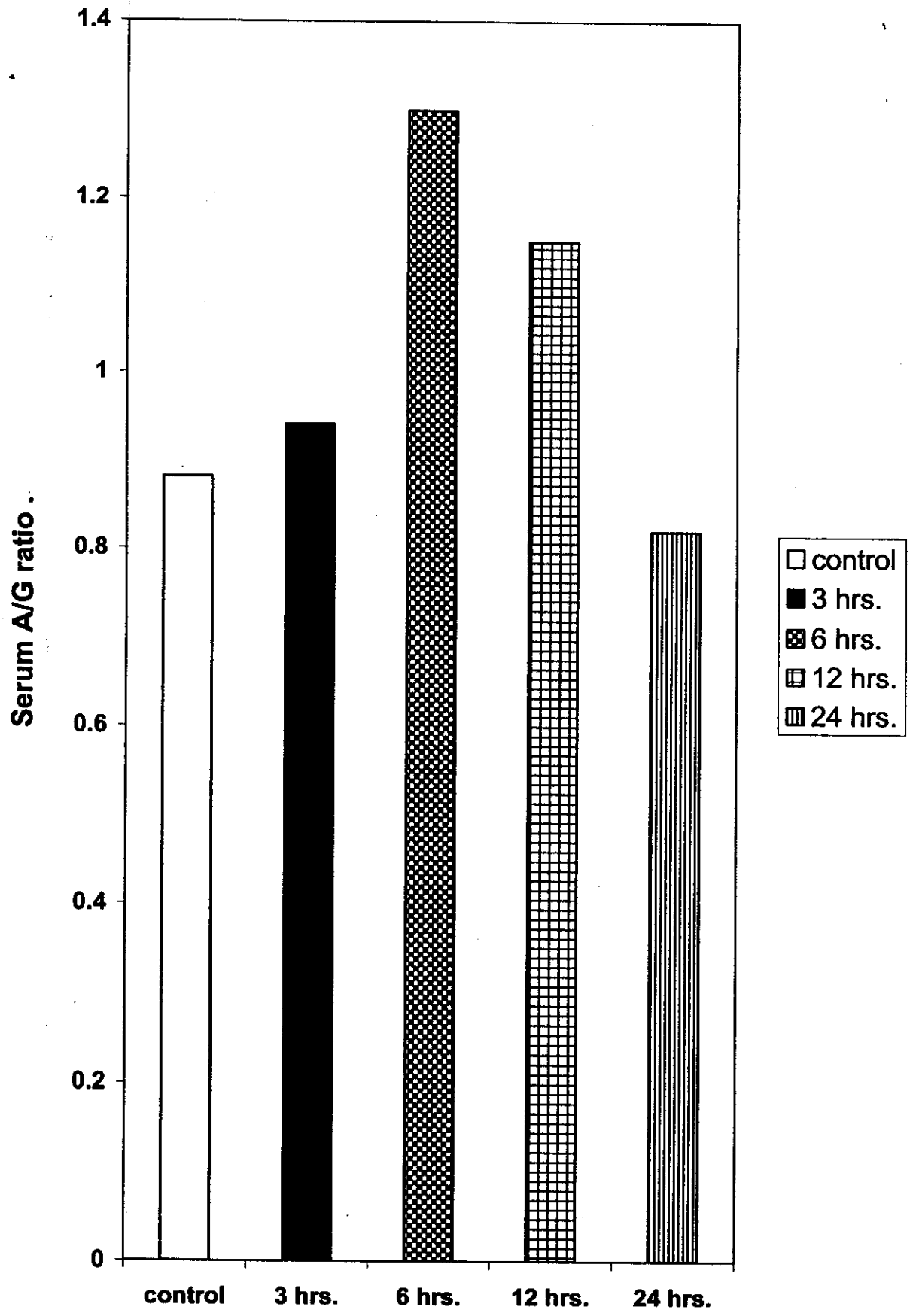

Fig. (22) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum A/G ratio of pigeon after 3, 6, 12 and 24 hours of treatment .

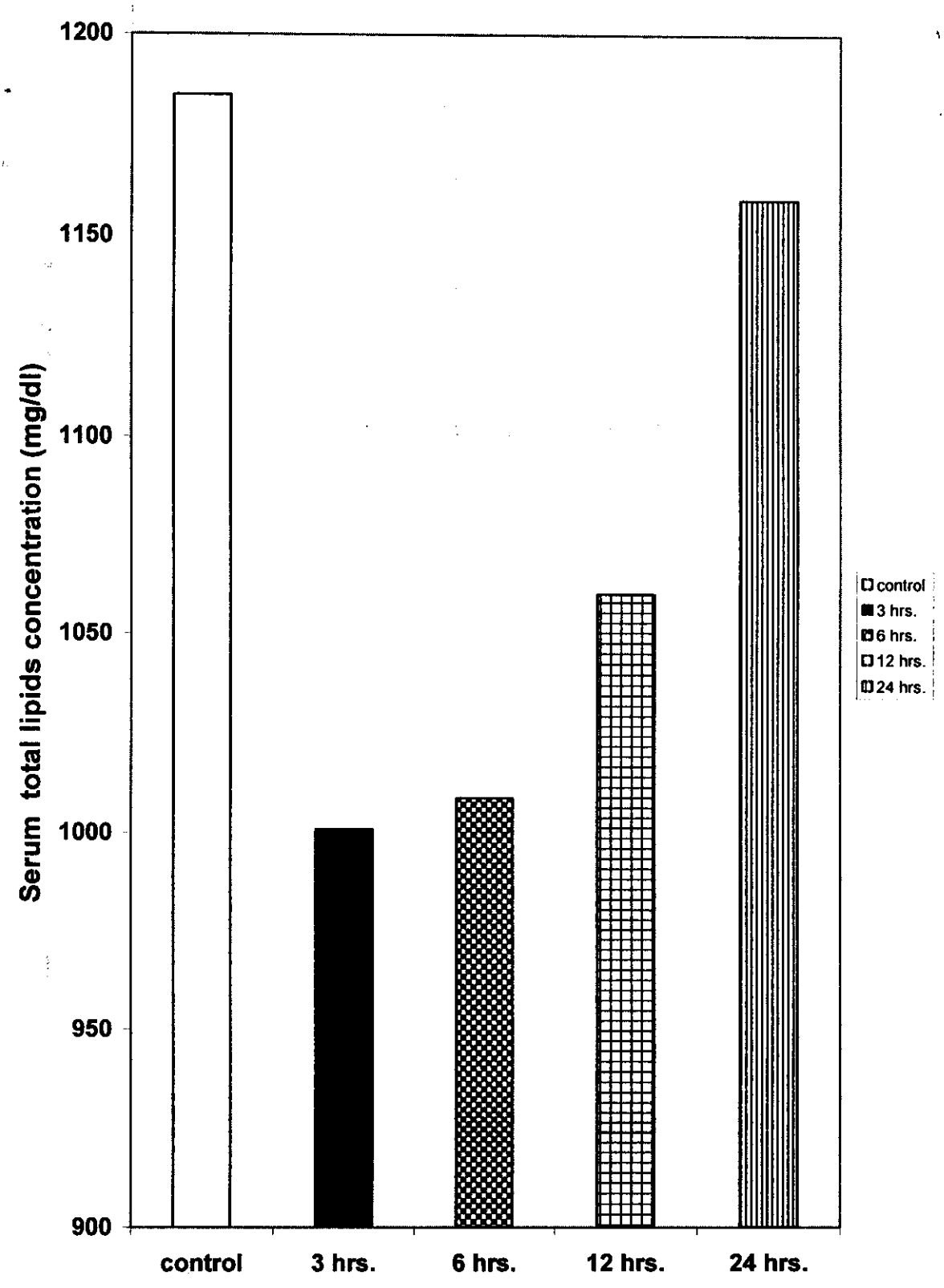

Fig. (23) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum total lipids concentration (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

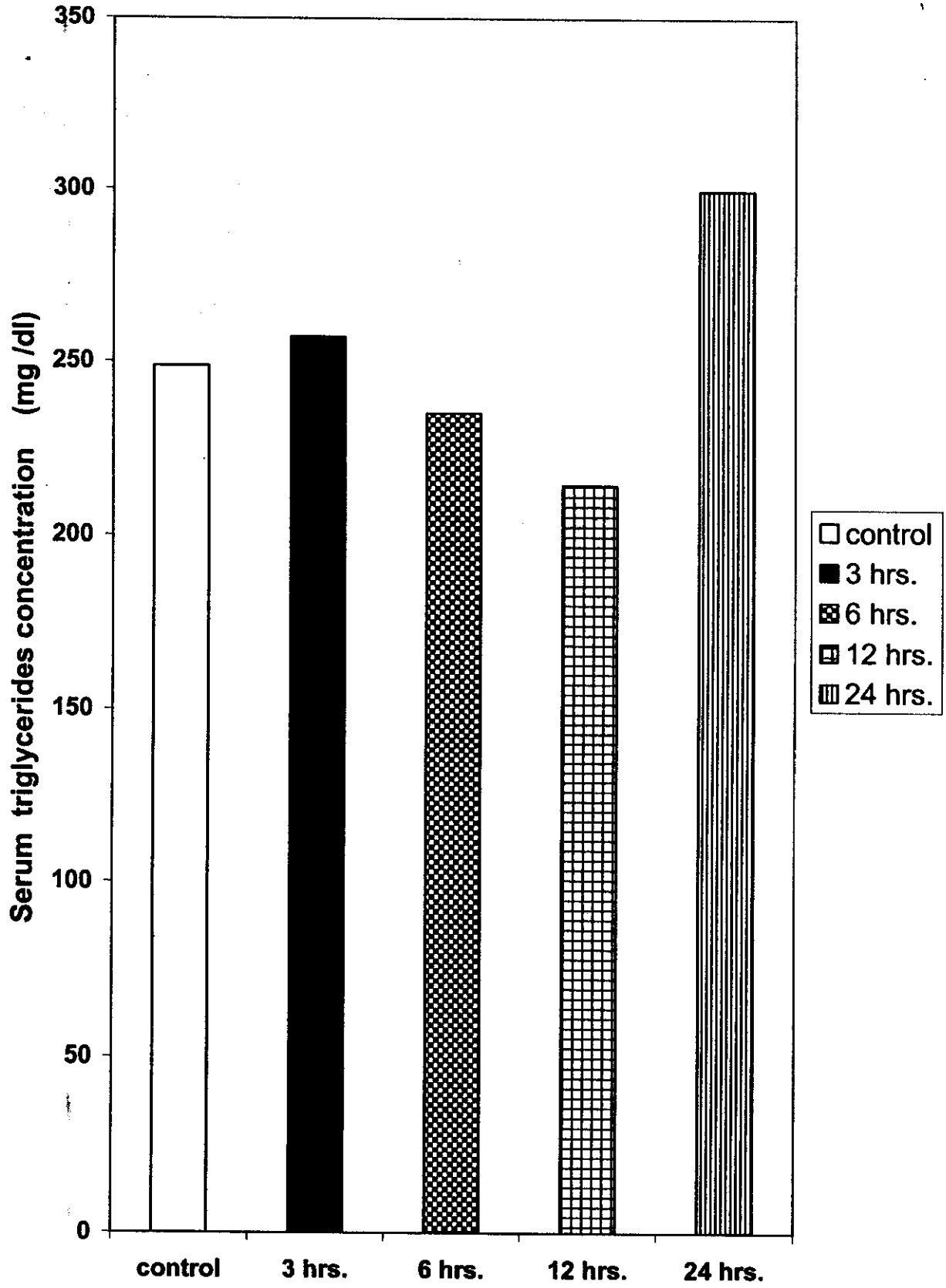

Fig. (24) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum triglycerides concentration (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment.

5) Serum Cholesterol Content :-

Serum cholesterol content of pigeons administered a single oral dose (1/2 LD_{50}) of propoxur after 3 hrs. (323.01 mg/dl) and 6 hrs. (324.68 mg/dl) were significantly increased as compared with that of control pigeons group (248.69 mg/dl). Non-significant changes were noticed in serum cholesterol content of pigeons 12 hrs. (264.21 mg/dl) and 24 hrs.(245.78 mg/dl) post-treatment (Table 5 and Figure 25).

6) Serum Transaminase Activities: -

a. Serum Aspartate Amino-transferase(AST) Activity :-

Treatment of pigeons with a single oral dose (1/2 LD_{50}) of propoxur caused significant increase in serum AST activity after 3 hrs. (185.60 U/l), 6 hrs. (203 U/l), 12 hrs. (286.80 U/l) and 24 hrs. (174 U/l) post-treatment as compared to that of the control group (59.40 U/l), (Table 6 and Figure 26) .

b.Serum Alanine Amino-transferase(ALT) Activity :-

The effects of a single oral dose (1/2LD_{50}) of propoxur on serum ALT activity in pigeons are presented in table(6) and figure (27). Serum ALT activity decreased significantly in all treated pigeon groups after 3 hrs. (29.80 U/l) , 6 hrs.(36.20 U/l) ,12 hrs. (27.60 U/l) and 24 hrs. (19.40 U/l) of treatment as compared to that of the control group (46 U/l).

7) Serum Urea Concentration : -

Variation in serum urea level in different experimental pigeon groups are presented in table (7) and figure (28). Treatment of pigeons with a single oral dose (1/2 LD_{50}) caused significant decrease in serum urea concentration of the control group (6.72 mg/dl) to 6.56, 6.08, 6.24 and 6.08 mg/dl after 3, 6, 12 and 24 hrs. of treament .

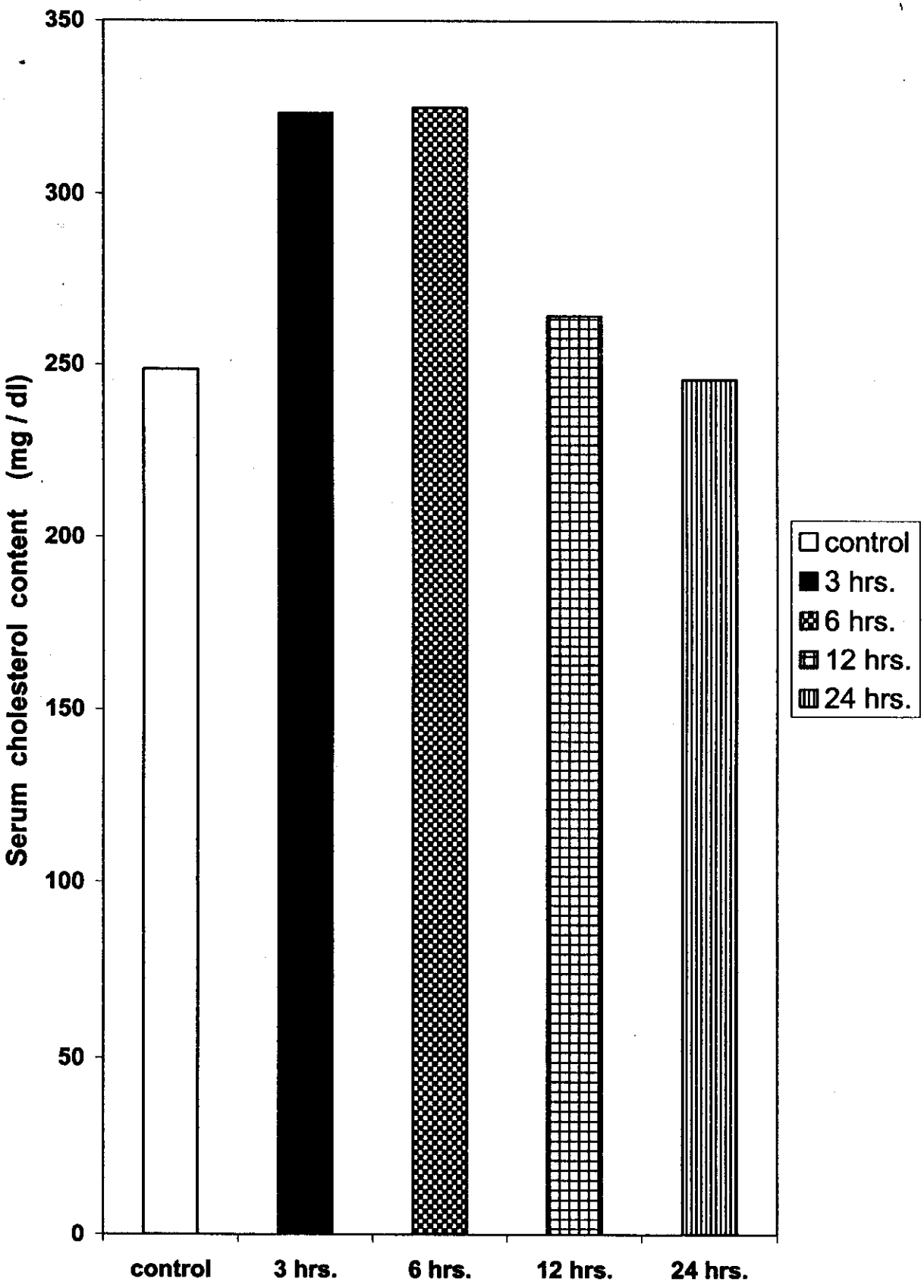

Fig. (25) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum cholesterol content (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

Table (6) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum aspartate amino – transferase (S-AST) and serum alanine amino transferase (S-ALT) activities of pigeon after 3, 6, 12 and 24 hours of treatment.

Parameter Mean ± SE	*Duration of Experiment (hrs.)*				
	Control	*3*	*6*	*12*	*24*
sAST (U/l)	$59.40^{abcde} \pm 3.25$	$185.60^{abd} \pm 11.47$	$203.00^{ac} \pm 27.19$	$286.80^{abde} \pm 63.01$	$174.00^{ade} \pm 13.32$
sALT (U/l)	$46.00^{abcde} \pm 1.41$	$29.80^{abe} \pm 3.37$	$36.20^{ace} \pm 4.12$	$27.60^{ad} \pm 3.44$	$19.40^{abce} \pm 2.09$

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

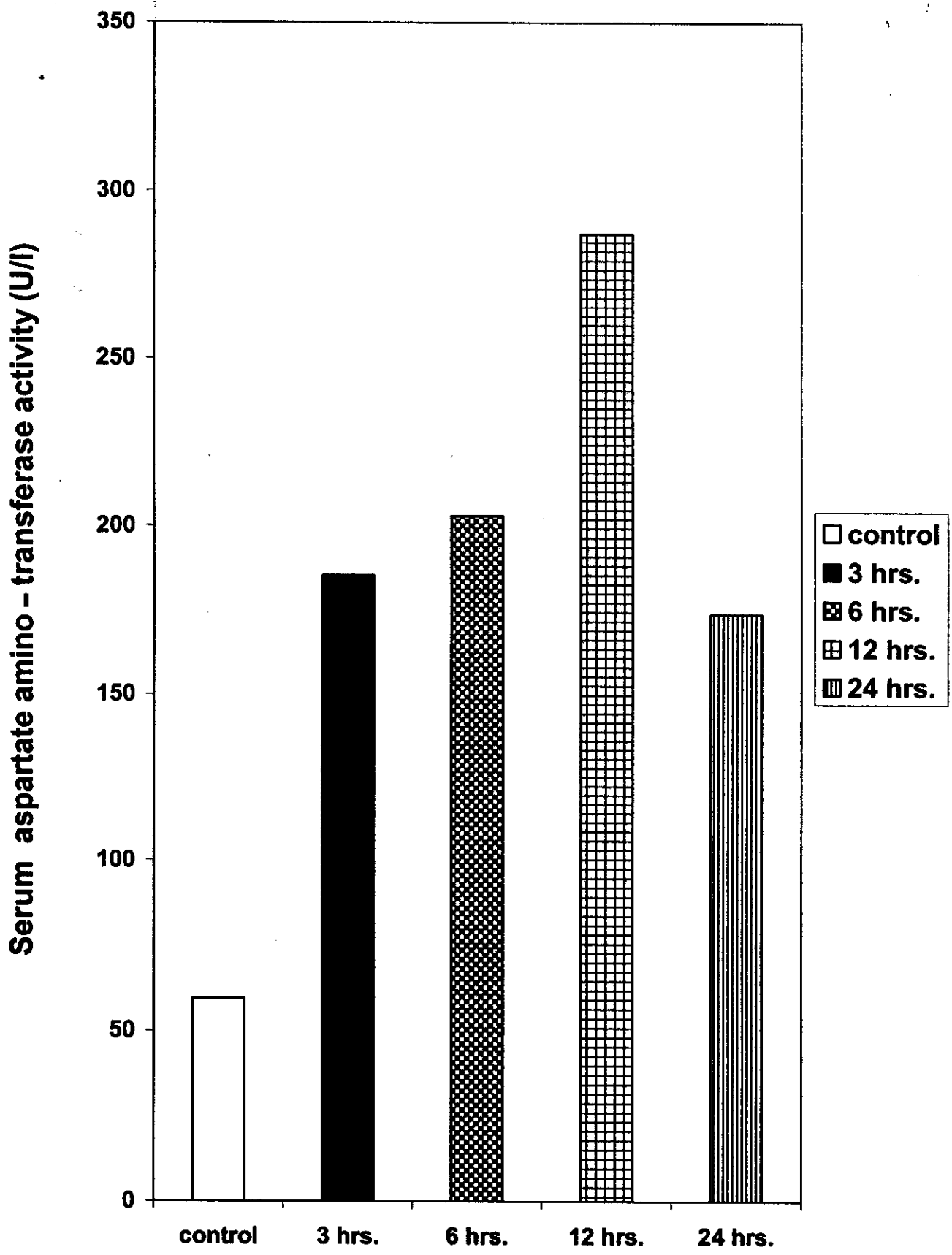

Fig. (26) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum aspartate amino-transferase activity (U/l) of pigeon after 3, 6, 12 and 24 hours of treatment .

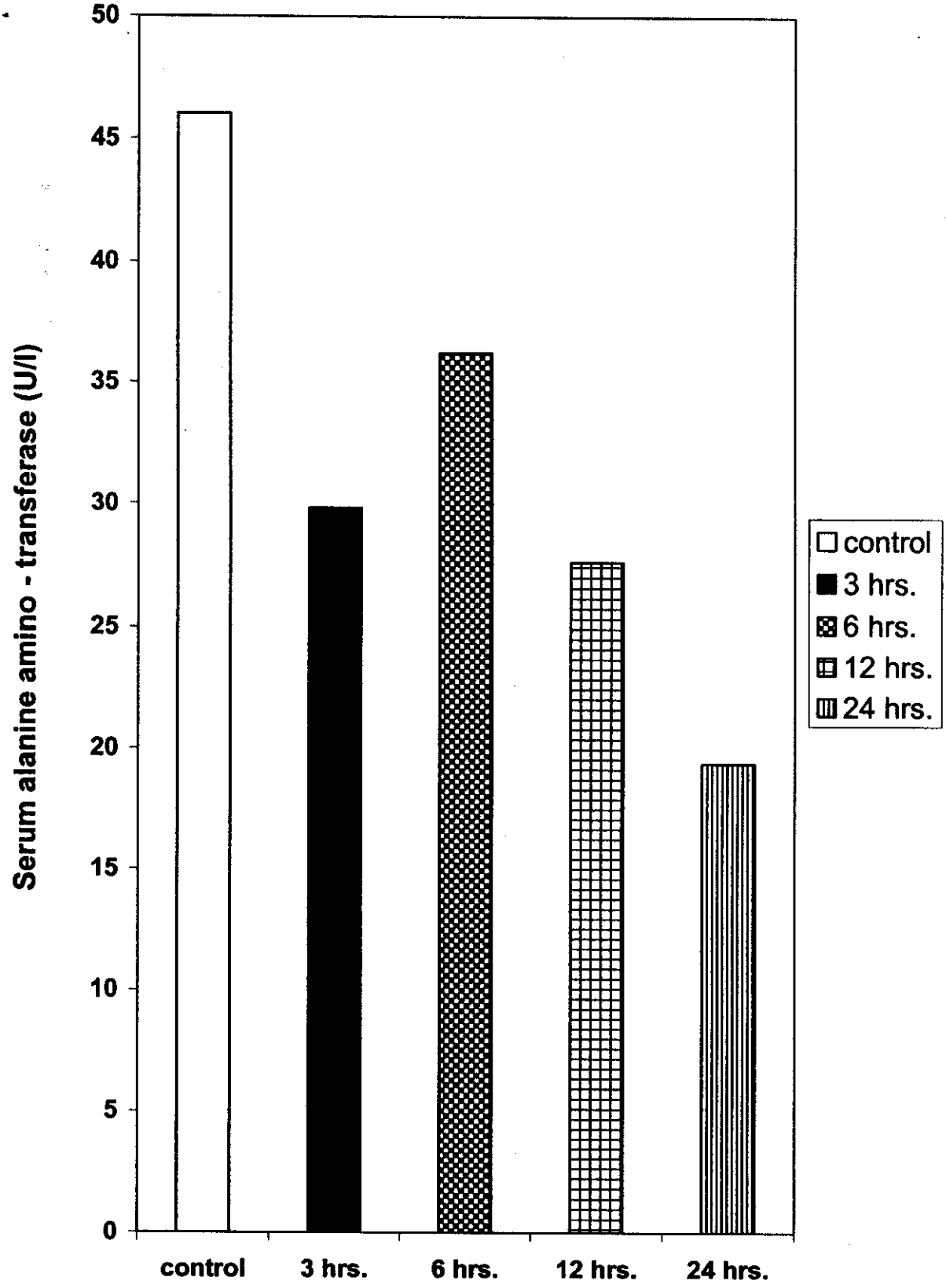

Fig. (27) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum alanine amino-transferase (U/l) of pigeon after 3, 6, 12 and 24 hours of treatment .

Table (7) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum urea, uric acid and creatinine concentrations (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE	*Duration of Experiment (hrs.)*				
	Control	*3*	*6*	*12*	*24*
Urea (mg/dl)	$6.72^{acde} \pm 0.23$	$6.56^{bce} \pm 0.20$	$6.08^{abc} \pm 0.06$	$6.24^{ad} \pm 0.15$	$6.08^{abe} \pm 0.05$
uric acid (mg/dl)	$5.68^{ac} \pm 0.10$	6.61 ± 0.20	$7.89^{acde} \pm 0.092$	$5.54^{cd} \pm 0.24$	$5.28^{ce} \pm 0.32$
Creatinine (mg/dl)	0.28 ± 0.04	0.24 ± 0.03	0.28 ± 0.02	0.28 ± 0.04	0.22 ± 0.02

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

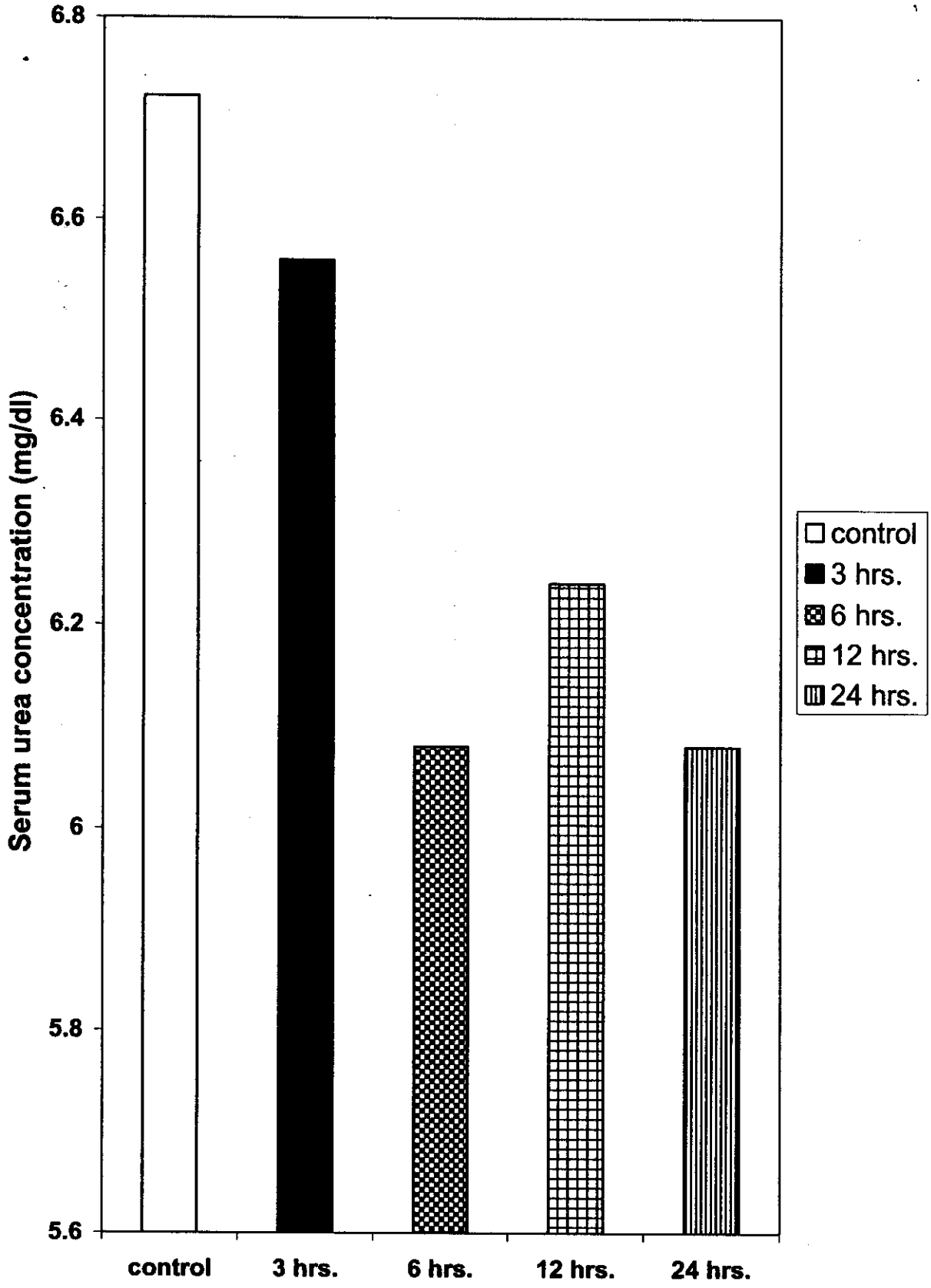

Fig. (28) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum urea concentration (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

8) Serum Uric Acid Concentration : -

Serum uric acid concentration was increased significantly after 6 hrs. (7.89 mg/dl) of administration of a single oral dose (1/2 LD_{50}) of propoxur , while those obtained after 3 hrs. (6.61 mg/dl), 12 hrs. (5.54 mg/dl) and 24 hrs. (5.28 mg/dl) were non-significantly changed as compared to that of the control pigeons group (5.68 mg/dl), (Table 7 and Figure 29).

9)Serum Creatinine Concentration :-

Non-significant differences were observed in serum creatinine concentration between control group (0.28 mg/dl), and all propoxur treated pigeons after 3 hrs. (0.24 mg/dl), 6 hrs. (0.28 mg/dl), 12 hrs. (0.28 mg/dl) and 24 hrs. (0.22 mg/dl) of treatment. These data were presented in table (7) and figure (30).

10) Serum Ions :

a. Serum Sodium Ions Concentration :-

Significant decrease in serum sodium ion concentration was observed in pigeons treated with a single oral dose (1/2 LD_{50}) of propoxur at 3 hrs. (127.20 µeq./L), 6 hrs. (138.60 µeq./L), 12 hrs. (139.20 µeq./L) and 24 hrs. (123.60 µeq./L) post-treatment as compared with control group(144.80 µeq./L), (Table 8 & Figure 31).

b. Serum Potassium Ions Concentration: -

The data shown in table (8) and figure (32) indicated a significant increase in serum potassium ions concentration after 3 hrs.(3.83 µeq./L) of a single oral dose (1/2 LD_{50}) of propoxur administration as compared to that of the control group (2.62 µeq./L). Non significant changes were observed in

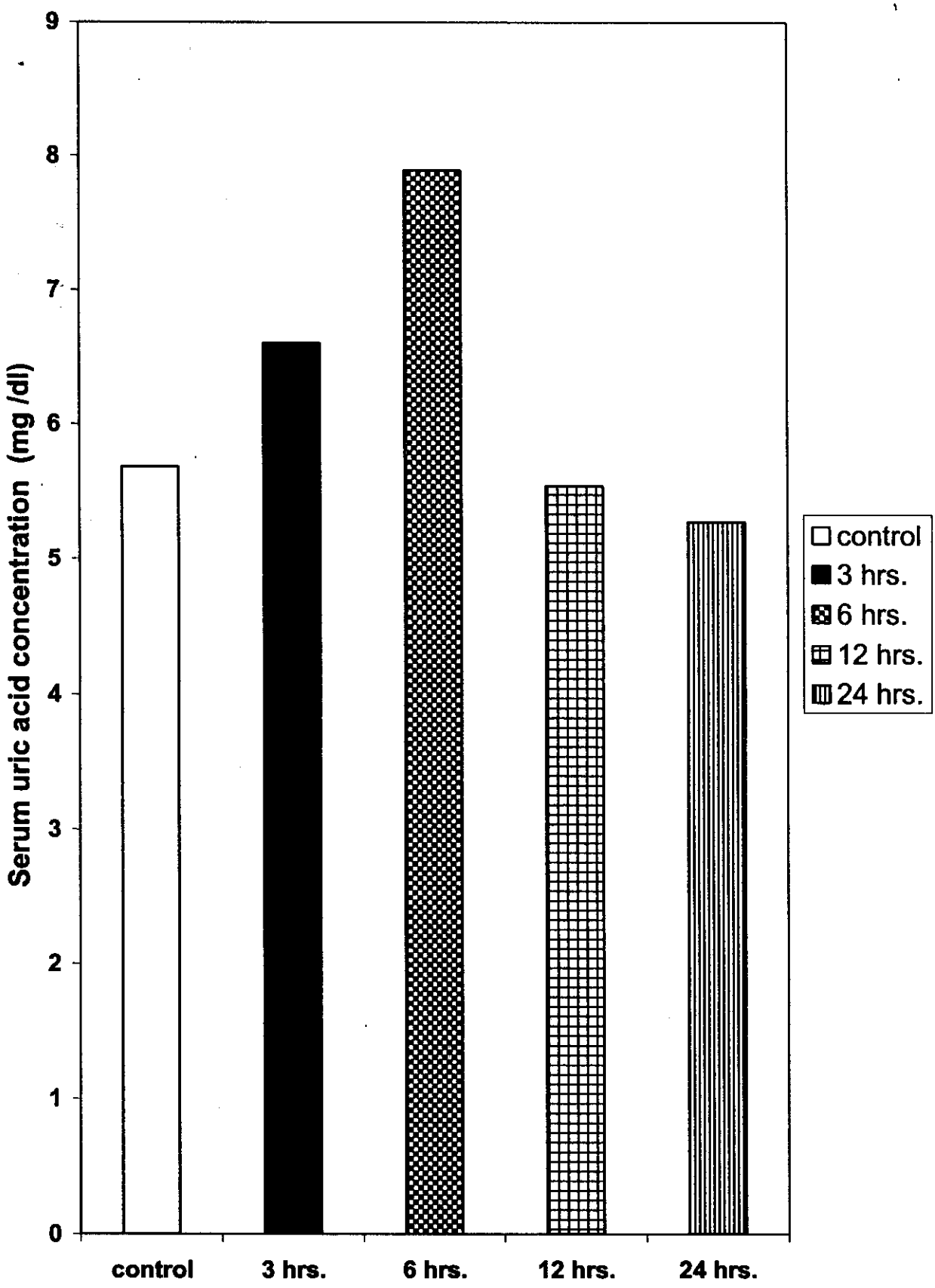

Fig. (29) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum uric acid concentration (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment .

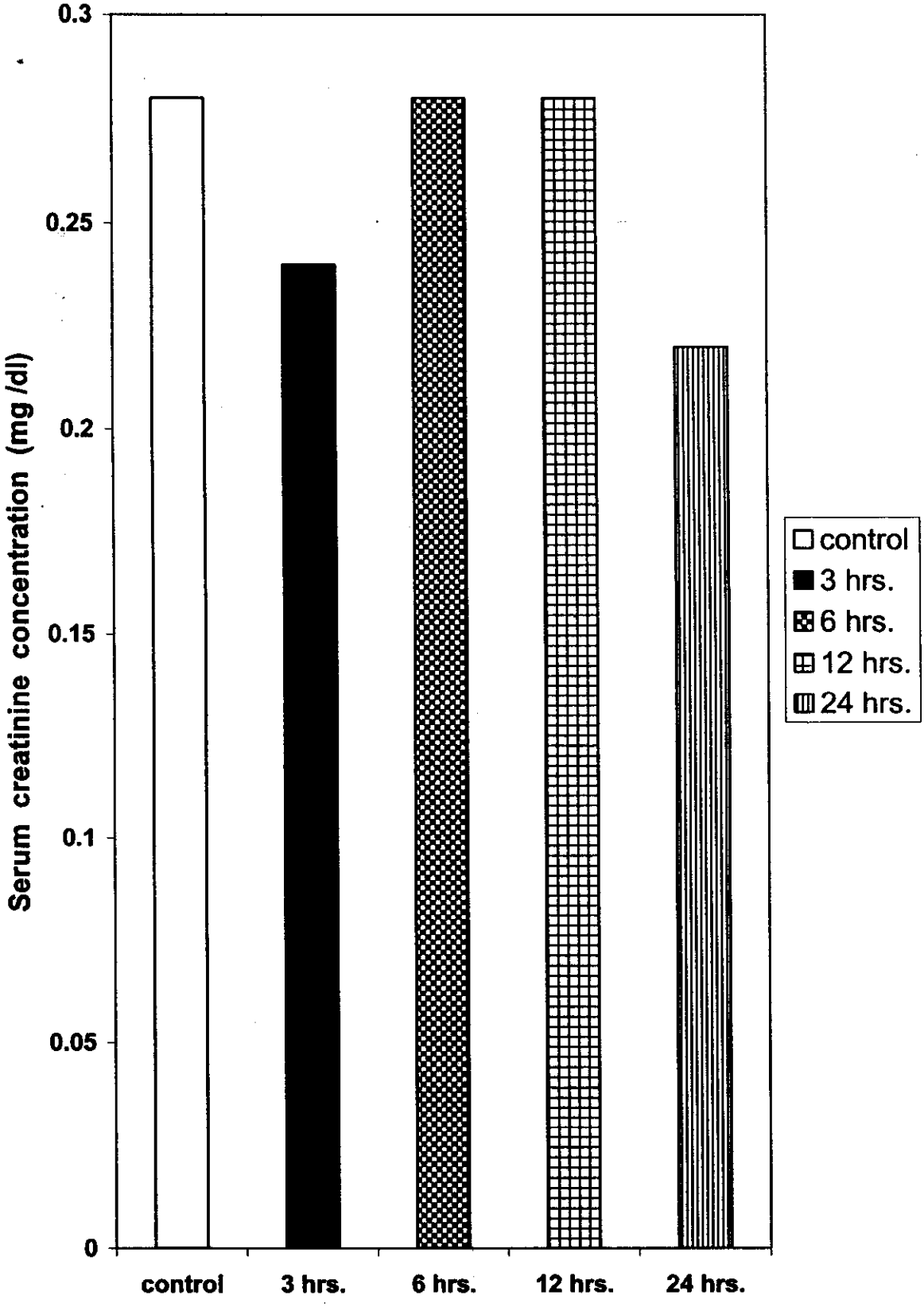

Fig. (30) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum creatinine concentration (mg/dl) of pigeon after 3, 6, 12 and 24 hours of treatment.

Table (8) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum sodium (Na^+) , potassium (K^+) and chloride (Cl^-) ions concentration of pigeon after 3, 6, 12 and 24 hours of treatment .

Parameter Mean ± SE	*Duration of Experiment (hrs.)*				
	Control	*3*	*6*	*12*	*24*
Na^+ (µeq. / L)	144.80 ^{abcde} ± 0.74	127.20 ^{abcde} ± 1.46	138.0 ^{abce} ± 1.05	139.20 ^{abde} ± 0.86	123.60 ^{abcde} ± 0.81
K^+ (µeq. / L)	2.62 ^{ab} ± 0.03	3.83 ^{abcde} ± 0.08	2.66 ^{bc} ± 0.21	2.66 ^{bd} ±0.46	1.94 ^{be} ± 0.30
Cl^- (µeq. / L)	106.80 ^{ab} ± 1.72	114.4 ^{abcde} ± 2.16	106.40 ^{bc} ± 1.69	103.40 ^{bd} ± 1.86	107.60 ^{be} ± 0.81

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

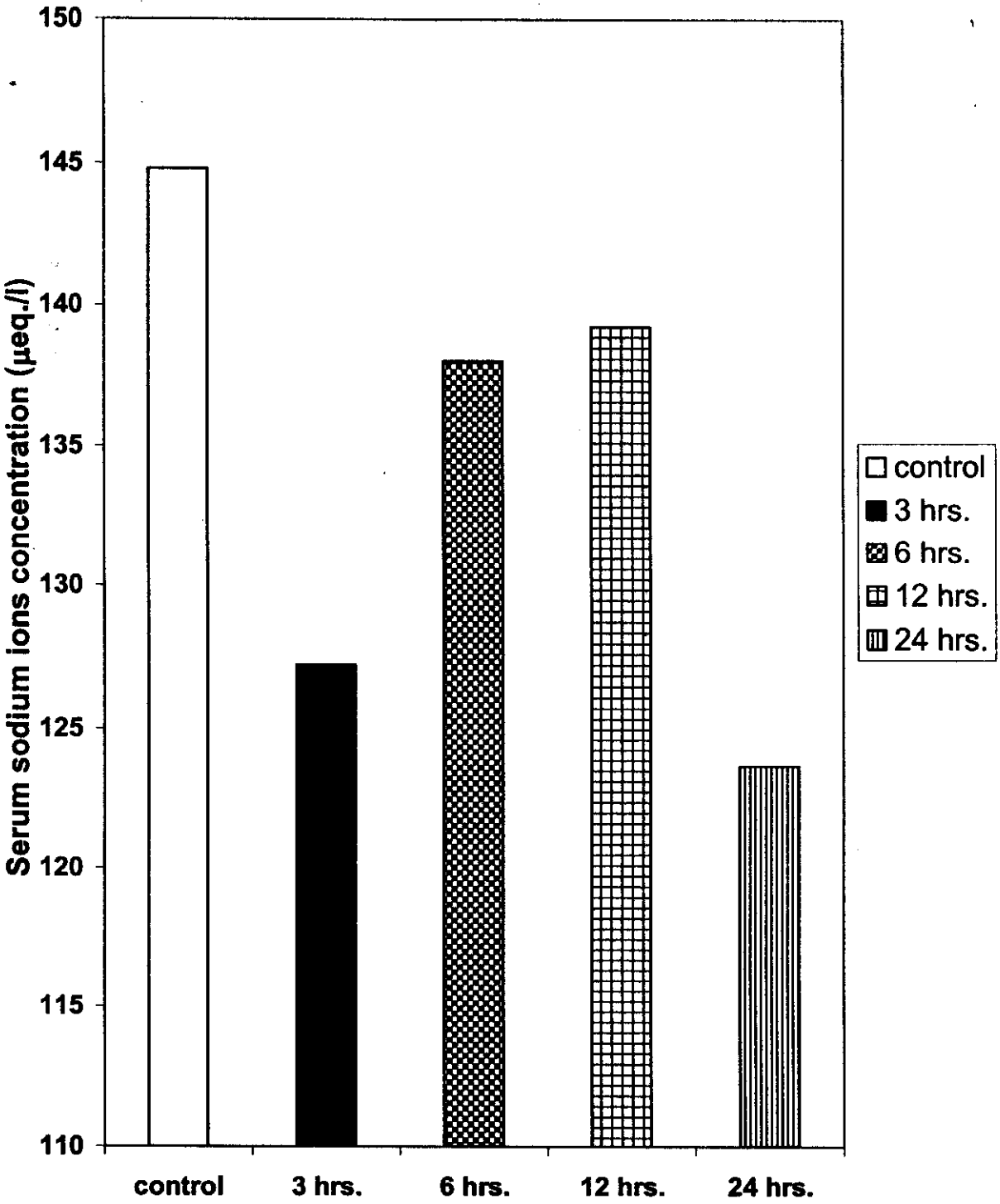

Fig. (31) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum sodium ions concentration (µeq./l) of pigeon after 3, 6, 12 and 24 hours of treatment .

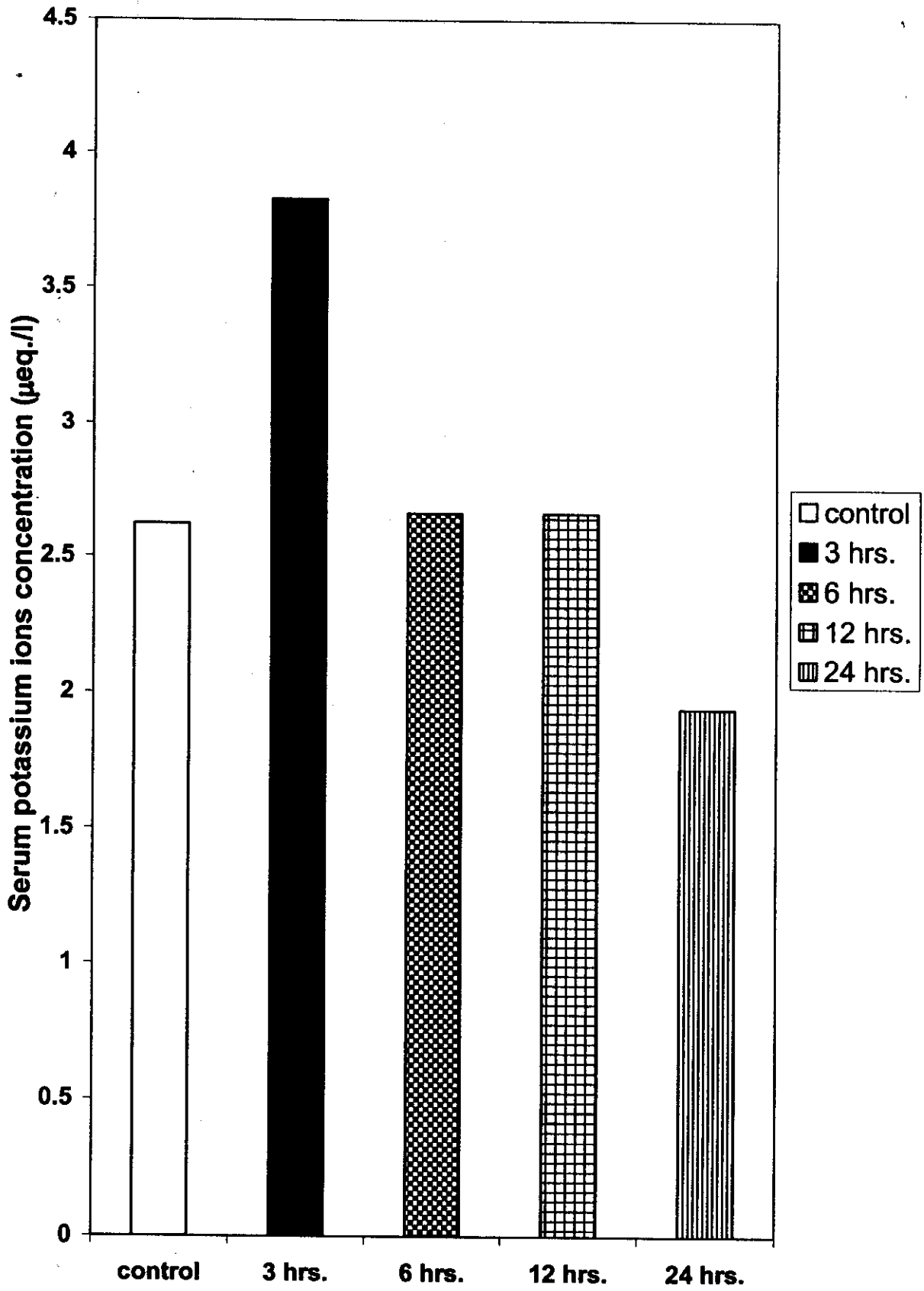

Fig. (32) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum potassium ions concentration (µeq./l) of pigeon after 3, 6, 12 and 24 hours of treatment .

serum potassium ions concentration at 6 hrs. (2.66 µeq./L), 12 hrs. (2.66 µeq./L) and 24 hrs. (1.94µeq./L) post-treatment with a single oral dose ($1/2LD_{50}$) of propoxur as compared with control group (2.62 µeq./L).

c. Serum Chloride Ions Concentration: -

The effect of administration of a single oral dose ($1/2\ LD_{50}$) of propoxur to pigeons on serum chloride ions concentration is presented in table (8) and figure (33) . Serum chloride ions concentration was increased significantly in treated pigeons at 3 hrs.(114.40 µeq./L) post-treatment as compared to control group (106.80 µeq./L). Non-significant changes were observed in serum chloride ions concentration at 6 hrs. (106.40 µeq./L), 12 hrs.(103.40 µeq./L) and 24 hrs. (107.60 µeq./L) post- treatment.

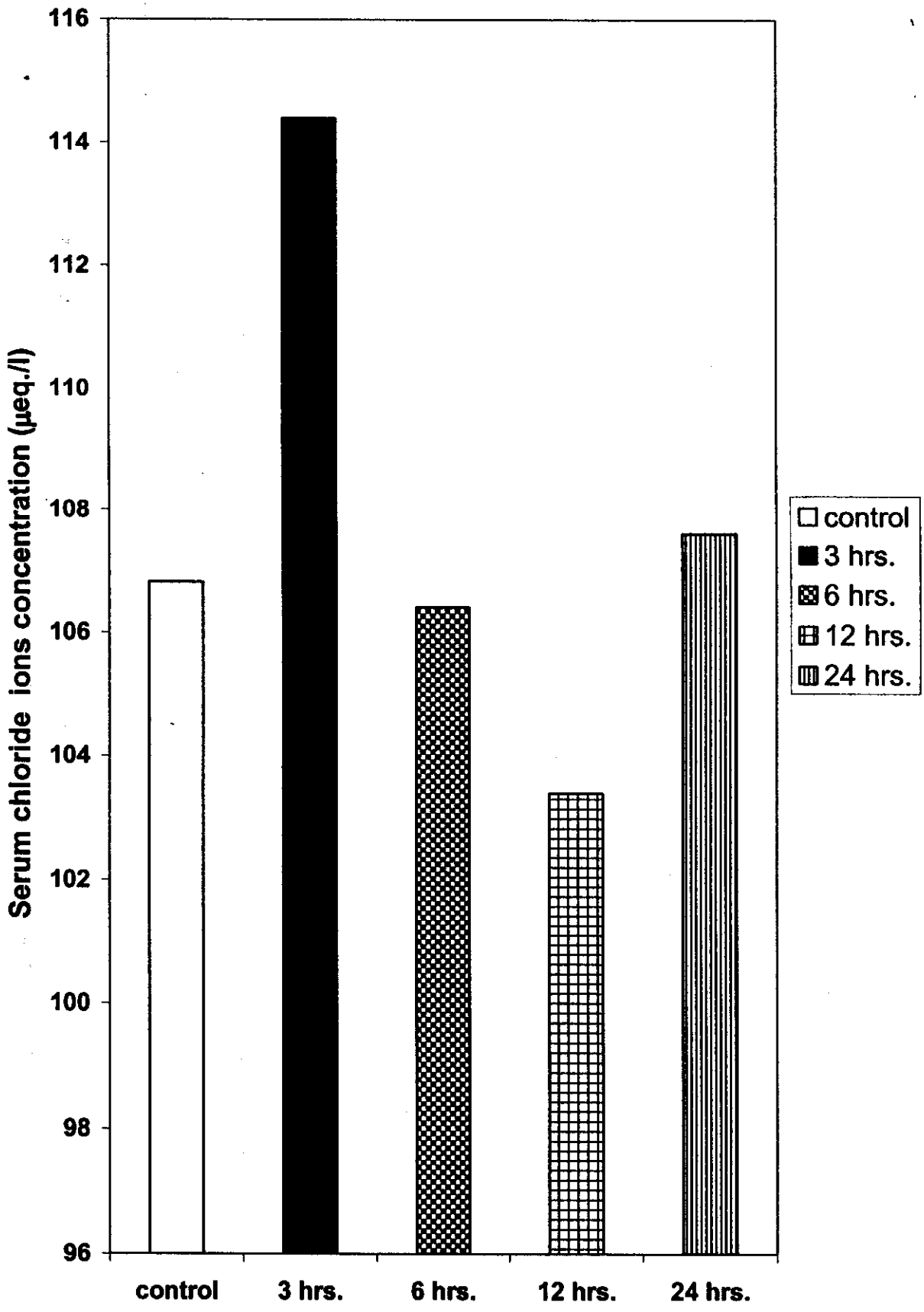

Fig. (33) : Effect of a single oral dose (1/2 LD_{50}) of propoxur on serum chloride ions concentration (µeq./l) of pigeon after 3, 6, 12 and 24 hours of treatment .

B - Effect of a Repeated Oral Dose :

I. Effect of a Repeated Oral Dose (1/10 LD_{50}) of Propoxur on Blood Parameters :

1- Blood Cells Count :-

a. White Blood Cells (WBCs) Count :-

The data recorded in table (9) and figure (34) indicated a marked increase in WBCs in pigeons treated with a repeated oral dose (1/10 LD_{50}) of propoxur after 3 doses ($22.6X10^3$ cell/mm^3), 6 doses ($15.3 X 10^3$ cell/mm^3) and 9 doses ($17.3 X10^3$ cell/mm^3) compared to that of control pigeons group ($11.2 X 10^3$ cell/mm^3).

b. Red Blood Cells(RBCs) Count :-

The data obtained are presented in table (9) and demonstrated by figure (35). It is apparent from the result that the administration of a repeated oral dose (1/10 LD_{50}) of propoxur to pigeons induced depression in RBCs count after 6 doses ($2.54X 10^6$ cell/mm^3) and 9 doses ($2.05X10^6$ cell/mm^3) as compared with controls ($3.25X10^6$ cell/mm^3). Statistical analysis of the previous data indicated significant reduction in RBCs count after 6 and 9 doses and non-significant reduction after 3 doses of treatment compared to that of the control .

2- Haemoglobin Content (Hb):-

Haemoglobin Content was reduced in pigeons treated with a repeated oral dose (1/10 LD_{50}) of propoxur after 3 doses (12.37 g/dl), 6 doses (10.76 g/dl) and 9 doses (10.37 g/dl) post-treatment, when compared with control pigeons group (14.64 g/dl), as shown in table (9) and figure (36).

Table (9) : Effect of a repeated (3, 6 and 9)oral dose (1/10 LD_{50}) of propoxur on haematological parameters of pigeon .

Parameter Mean ± SE	*Number of oral doses*			
	Control	*3*	*6*	*9*
WBCs ($\times 10^3$ Cell /mm^3)	11.20^{abcd} ± 0.85	22.60^{abcd} ± 0.87	15.30^{abc} ± 1.52	17.30^{abd} ± 0.94
RBCs ($\times 10^6$ Cell /mm^3)	3.25^{acd} ± 0.09	3.08^{bcd} ± 0.04	2.54^{abcd} ± 0.04	2.05^{abcd} ± 0.06
Hb (g / dl)	14.64^{abcd} ± 0.15	12.37^{abcd} ± 0.67	10.76^{abc} ± 0.16	10.73^{abd} ± 0.24
Hct (%)	45.20^{abcd} ± 0.53	32.00^{ab} ± 0.55	30.80^{ac} ± 0.37	31.60^{ad} ± 1.44
MCV (μ^3)	154.62^{abc} ± 7.11	103.98^{abcd} ± 2.26	121.58^{abcd} ± 3.39	154.20^{bcd} ± 3.36
MCH (Pg)	51.54^{abc} ± 1.34	40.12^{abd} ± 1.80	42.43^{acd} ± 0.79	52.56^{bcd} ± 1.26
MCHC (%)	36.31 ± 1.84	38.78 ± 2.44	34.97 ± 0.82	34.18 ± 1.39

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

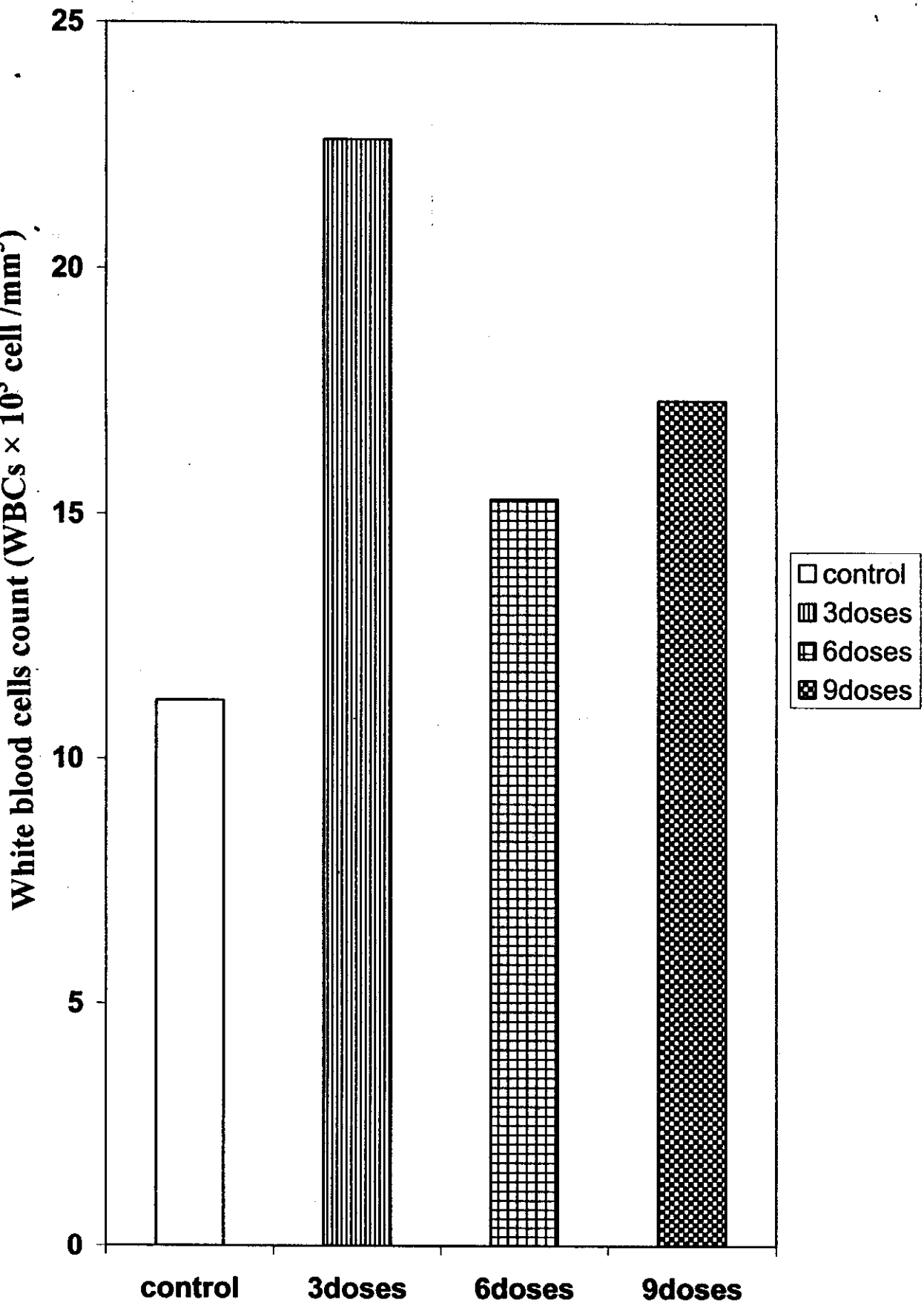

Fig. (34) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on white blood cells count (WBCs) of pigeon.

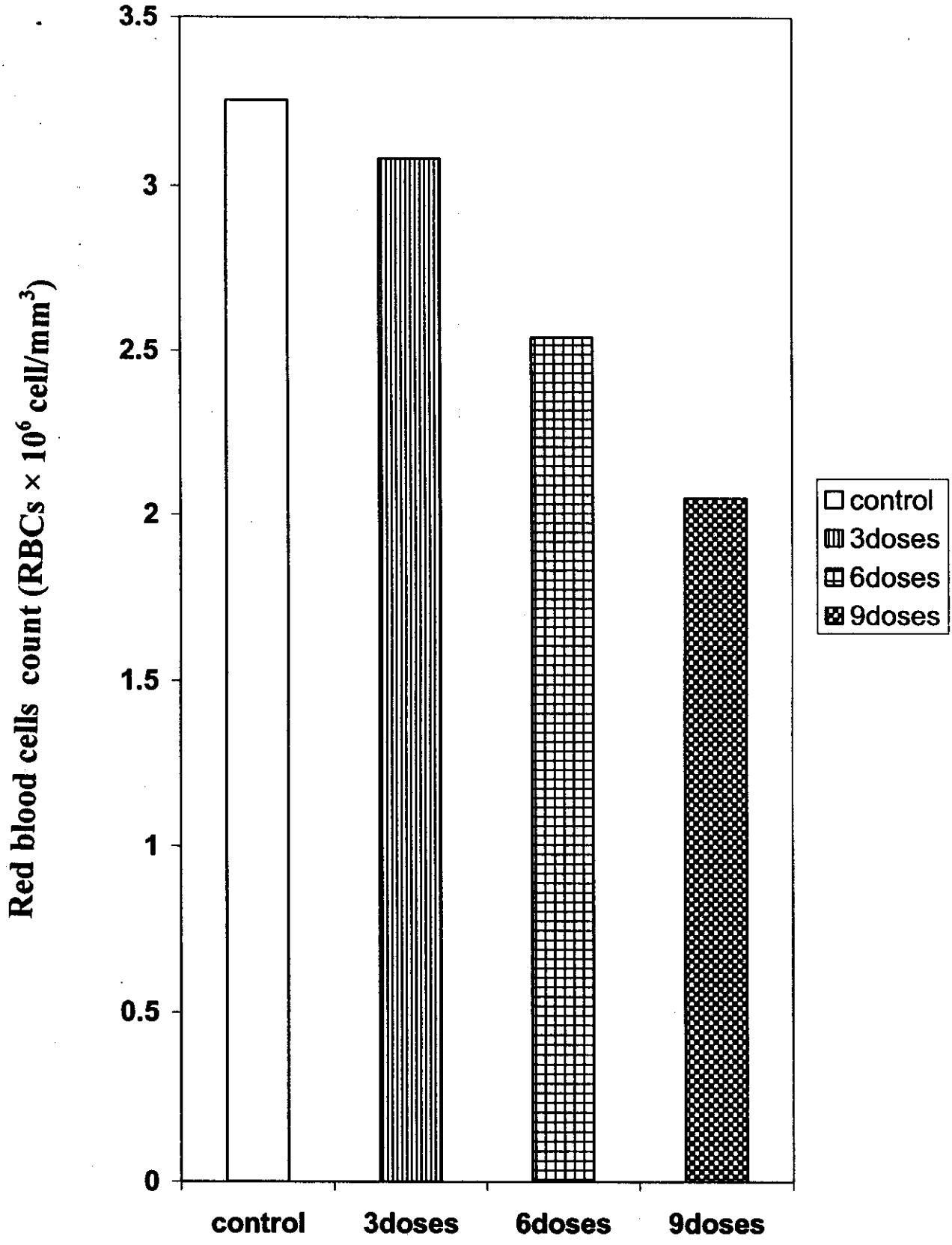

Fig. (35) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on red blood cells count (RBCs) of pigeon .

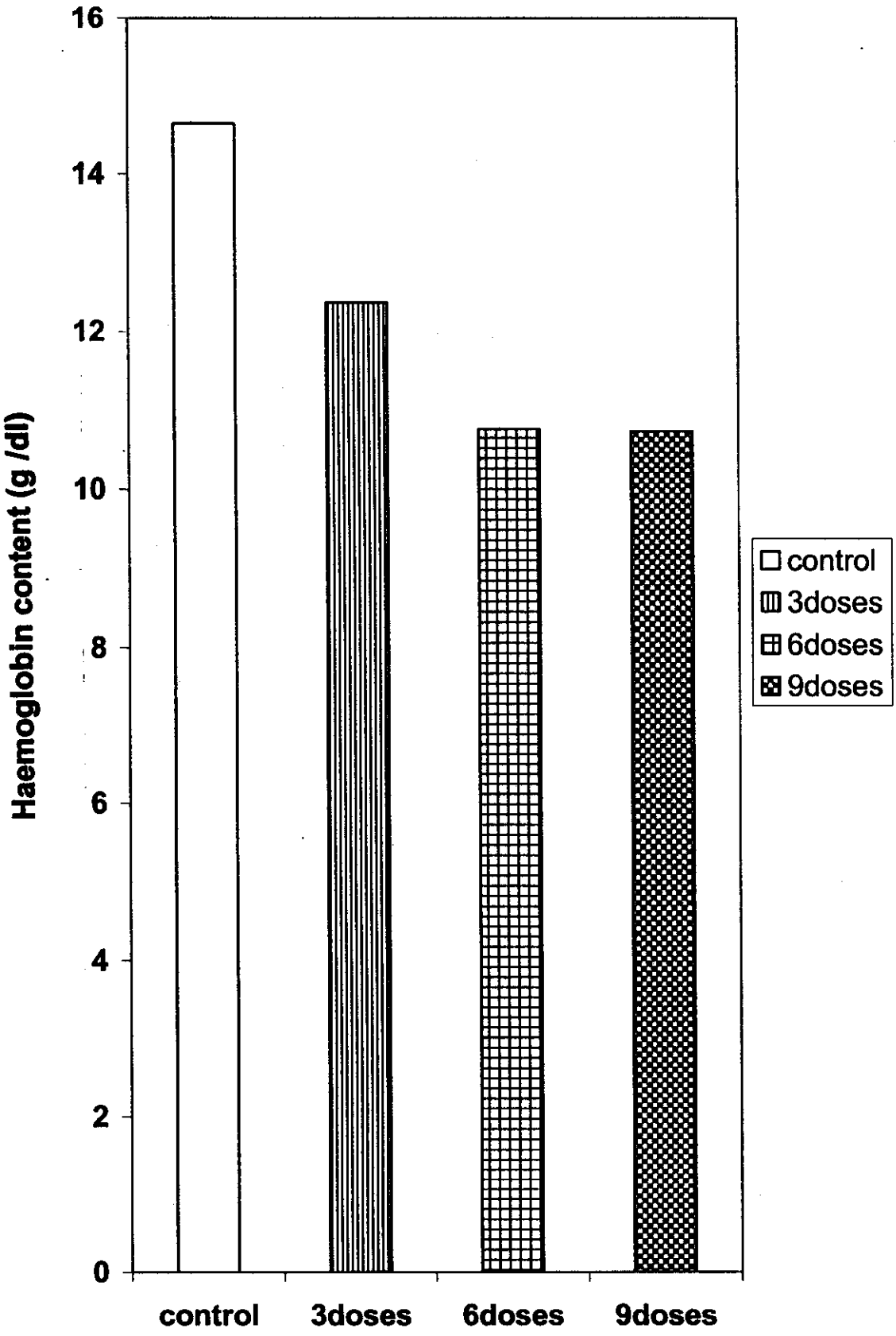

Fig. (36) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on haemoglobin content (g/dl) of pigeon .

3 - Haematocrite (Hct) :-

The data shown in table (9) and figurer (37) indicated a decrease of Hct value 32, 30.8 and 31.6 % after 3, 6 and 9 doses, respectively of propoxur (1/10 LD_{50}) as compared with control value (45.20 %).

4 - Blood Indices : -

a. Mean Cell Volume (MCV) :-

As shown in table (9) and figure (38) mean cell volume was significantly decreased after 3 doses (103.98 μ^3) and 6 doses (121.58 μ^3) of propoxur treatment. After 9 doses treated pigeons showed non-significantly change of MCV (154.20 μ^3) compared with that of control pigeons (154.62 μ^3) .

b. Mean Cellular Haemoglobin (MCH) :-

Mean cellular haemoglobin exhibited significant decreases in response to administration of a repeated oral dose (1/10 LD_{50}) of propoxur (40.12 and 42.43 Pg for 3 doses and 6 doses , respectively), while after 9 doses non- significantly changed (52.56 Pg) was recorded as compared with control (51.54 Pg), (Table 9 & Figure 39).

C . Mean Cellular Haemoglobin Concentration (MCHC) :-

Unaltered MCHC was observed in pigeons after treatment with a repeated oral dose (1/10 LD_{50}) of propoxur; after 3 doses (38.78 %), 6 doses (34.97 %) and 9 doses (34.18%), compared with control pigeons group (36.31 %) . These data are presented in table (9) and figure (40) .

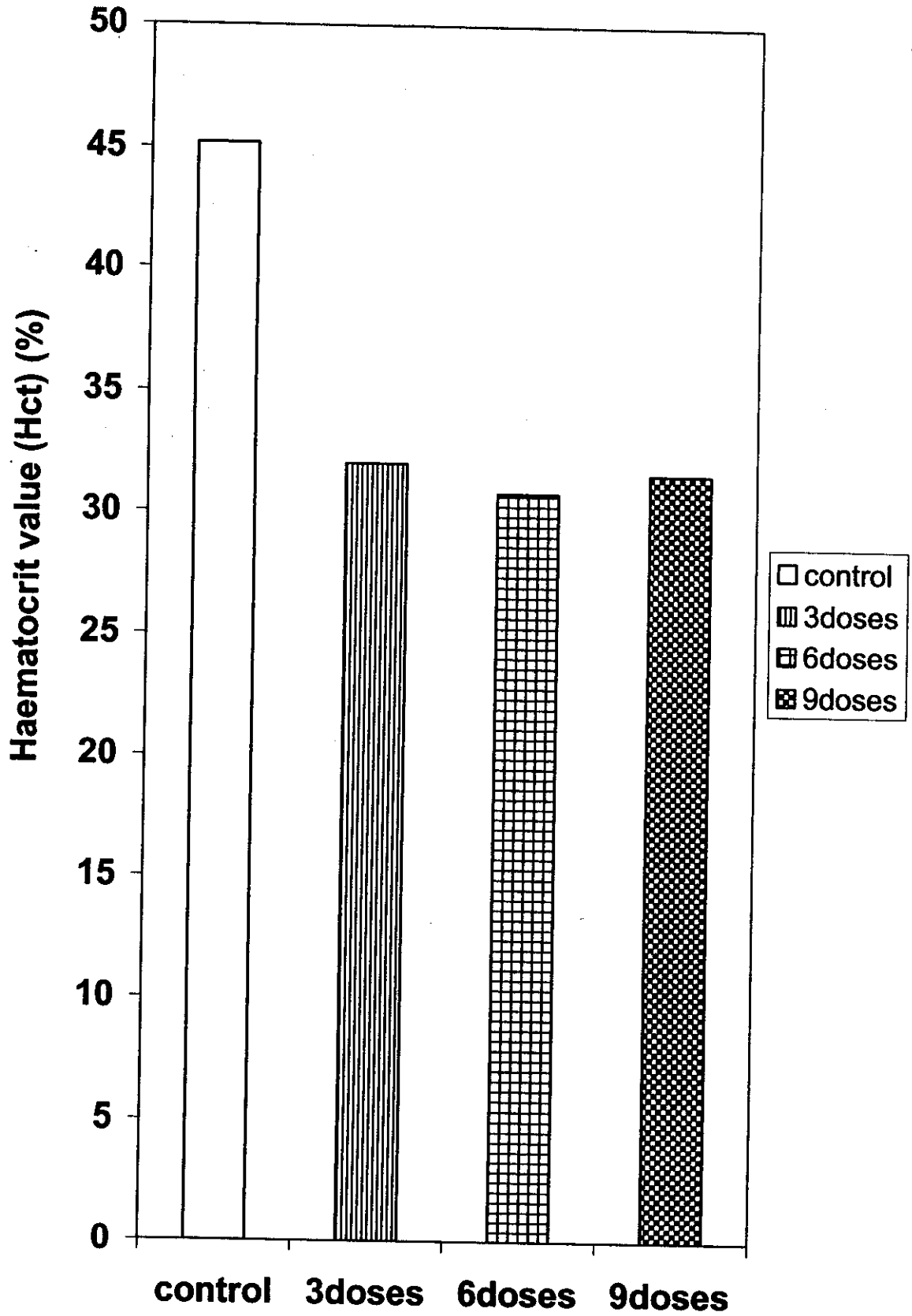

Fig. (37) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on haematocrite value (Hct) (%) of pigeon.

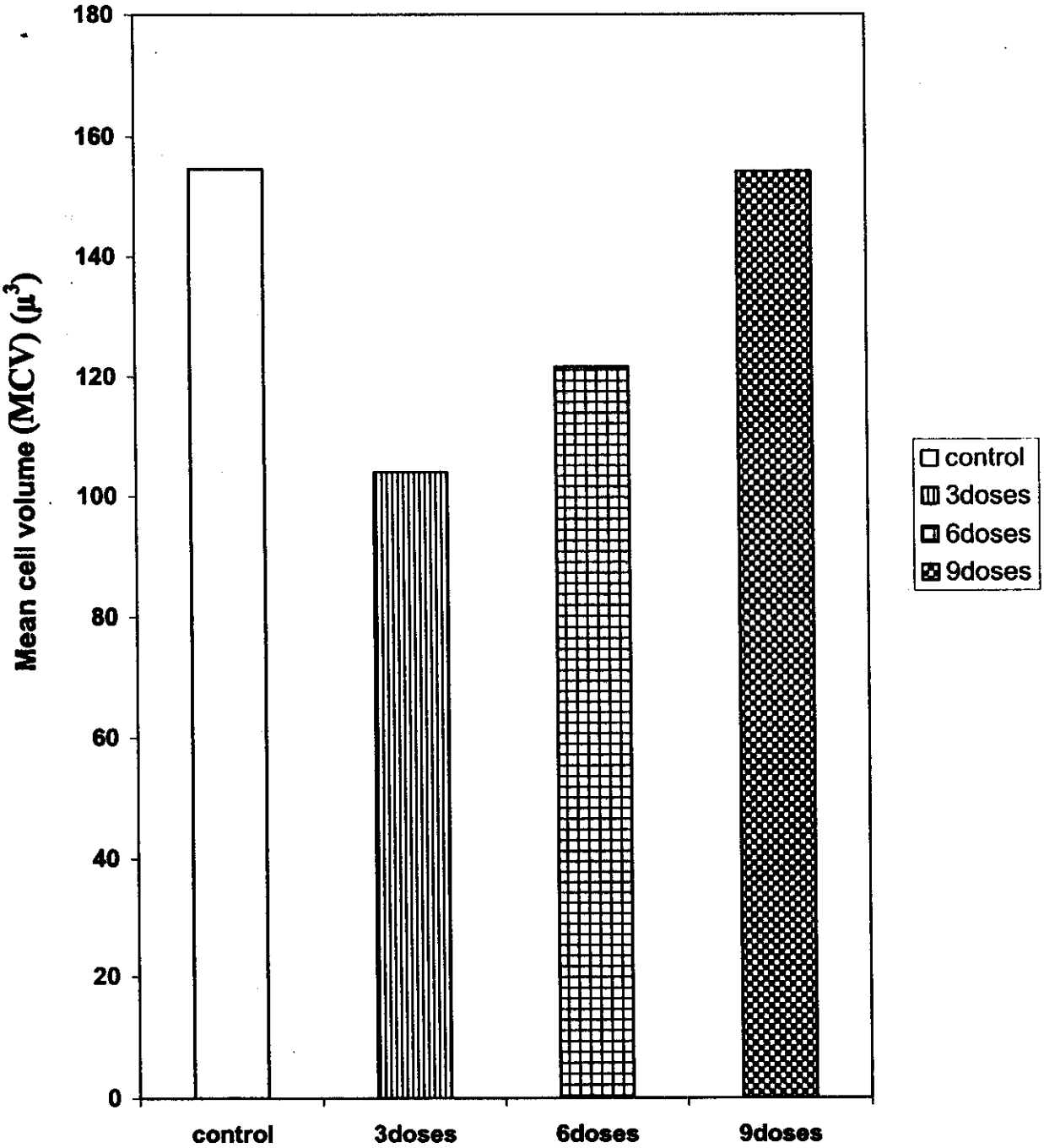

Fig. (38) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on mean cell volume (MCV) (μ^3) of pigeon.

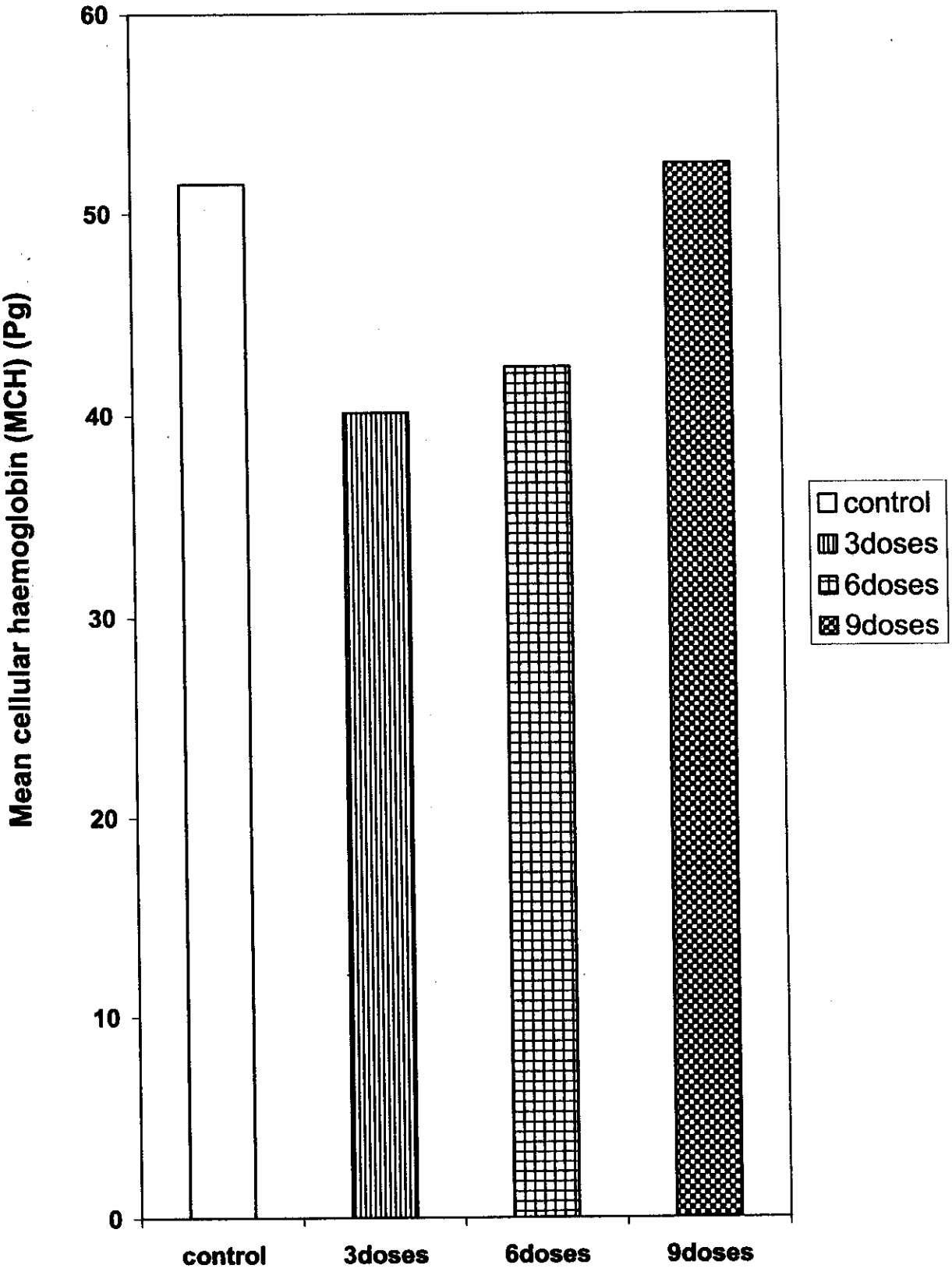

Fig. (39) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on mean cellular haemoglobin (MCH) (Pg) of pigeon.

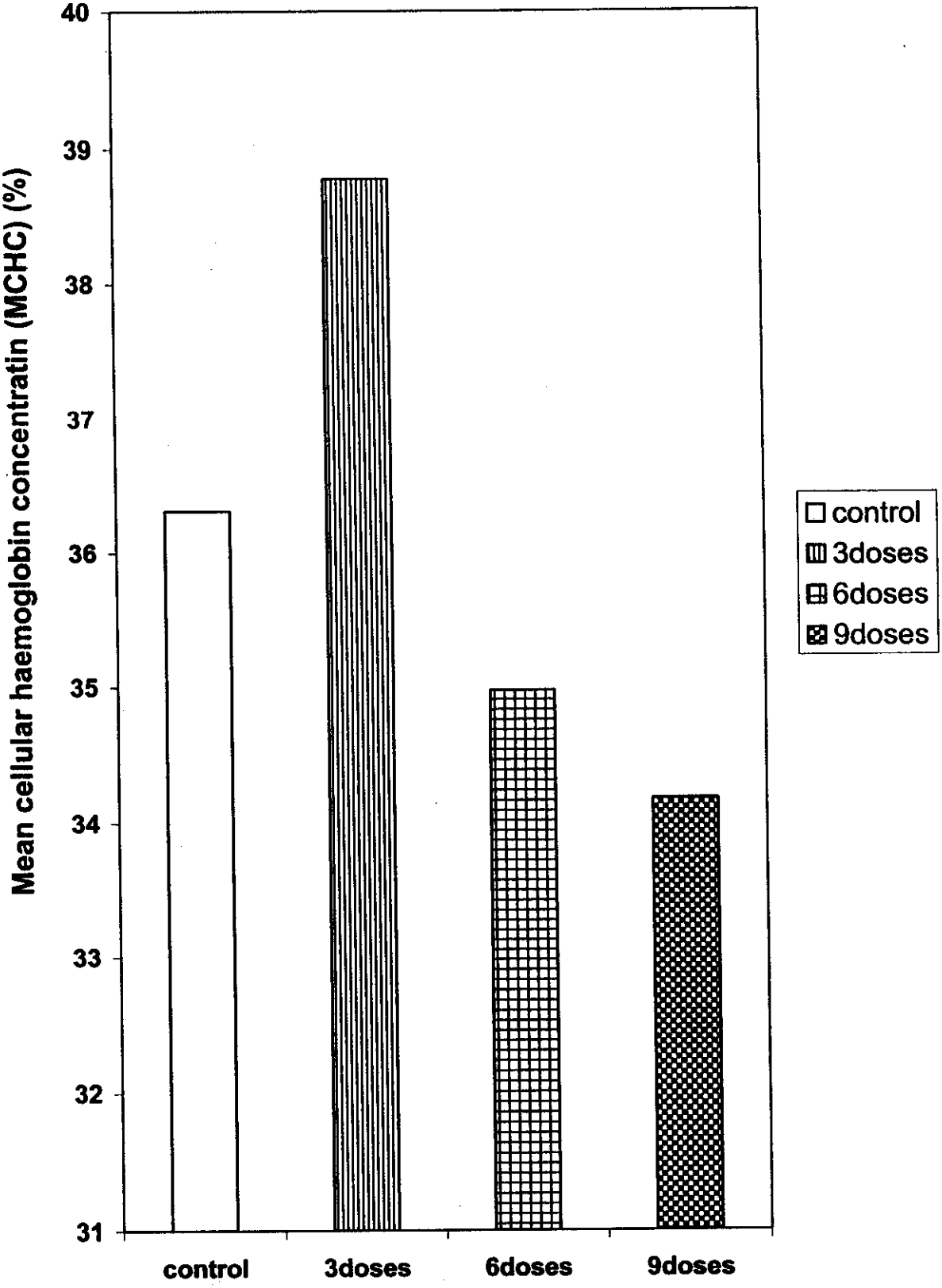

Fig. (40) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on mean cellular haemoglobin concentration (MCHC) (%)of pigeon.

II. Effect of a Repeated Oral Dose (1/10 LD_{50}) of Propoxur on Respiratory Functions of Blood

1. Blood Gases :-

The effect of repeated oral doses (1/10 LD_{50} each) of propoxur on the blood gases (PO_2 &PCO_2) of both arterial and venous blood of the pigeons after 3 , 6 and 9 doses of propoxur administration compared to control group are shown in table (10) and figures (41, 42 & 43). The calculated P_AO_2, $P_{A-a}O_2$ and the percent venous admixture (% Shunt) are also presented in table (10) and figures (41) .

Analysis of the data declared that both arterial and venous oxygen partial pressure (P_aO_2& P_vO_2) were decreased significantly subsequent to 3, 6 and 9 doses of propoxur administration as compared to those of control group .Also, alveolar oxygen partial pressure (P_AO_2) was significantly decreased after 3 doses while, it was non-significantly decreased after 6 and 9 doses as compared to that of the control group.

The percent arterio-venous difference of oxygen partial pressure was significantly increased after 6 and 9 doses while it was non-significantly changed after 3 doses as compared to that of the control group.The percentage of venous admixture (% shunt) after 3, 6 and 9 doses was increased significantly compared to that of control pigeons group. Alveolar-arterial oxygen partial pressure difference was increased significantly after 3 and 6 doses and non-significantly after 9 doses of propoxur administration as compared to control pigeons group .

Percent oxygen saturation (% O_2 sat.) of arterial and venous blood after administration 3, 6 and 9 doses of propoxur (1/10 LD_{50} each) were

Table(10) : Effect of a repeated (3, 6 and 9)oral dose (1/10 LD_{50}), of propoxur on blood gases of pigeon .

Parameter Mean ± SE		*Number of oral doses*			
		Control	*3*	*6*	*9*
PO_2 (mmHg)	a	74.67 $^{a'bcd}$ ± 2.40	54.67 $^{a'bcd}$ ± 0.84	64.0 $^{a'bc}$ ± 0.93	68.67 $^{a'bd}$ ± 1.78
	v	50.50 $^{a'bcd}$ ± 1.20	37.00 $^{a'b}$ ± 1.44	36.83 $^{a'c}$ ± 0.70	39.83 $^{a'd}$ ± 1.20
	% (a-v)	32.25 $^{a'cd}$ ± 0.78	32.41 ^{bcd} ± 1.85	42.47 $^{a'bc}$ ± 0.36	41.93 $^{a'bd}$ ± 1.41
	A	125.04 $^{a'b}$ ± 2.22	111.17 $^{a'bcd}$ ± 1.42	121.50 ^{bc} ± 1.07	120.44 ^{bd} ± 1.49
	A-a	50.38 $^{a'bc}$ ± 2.18	56.49 $^{a'b}$ ± 0.93	57.50 $^{a'cd}$ ± 1.85	51.78 ^{cd} ± 1.67
	%shunt	52.38 $^{a'bcd}$ ± 1.92	76.22 $^{a'bcd}$ ± 1.28	67.84 $^{a'bc}$ ± 1.34	64.22 $^{a'bd}$ ± 1.88
% O_2 Sat.	a	96.08 $^{a'bcd}$ ± 0.24	90.38 $^{a'bcd}$ ± 0.37	94.57 $^{a'bc}$ ± 0.39	93.87 $^{a'bd}$ ± 0.80
	v	77.08 $^{a'bcd}$ ± 1.05	63.20 $^{a'bd}$ ± 2.56	62.53 $^{a'cd}$ ± 1.86	68.98 $^{a'bcd}$ ± 1.49
	% (a-v)	19.79 $^{a'bcd}$ ± 0.92	30.16 $^{a'b}$ ± 2.61	33.93 $^{a'cd}$ ± 1.72	26.52 $^{a'cd}$ ± 1.05
PCO_2 (mmHg)	a	27.17 $^{a'b}$ ± 1.78	38.33 $^{a'bcd}$ ± 1.15	30.0 ^{bc} ± 0.86	30.83 ^{bd} ± 1.20
	v	36.50 $^{a'bcd}$ ± 0.89	43.17 $^{a'bc}$ ± 1.78	48.50 $^{a'bcd}$ ± 1.34	43.83 $^{a'cd}$ ± 0.70
	% (a-v)	-40.97 $^{a'bc}$ ± 2.56	-12.40 $^{a'bcd}$ ± 1.45	-61.70 $^{a'bcd}$ ± 0.65	-44.95 ^{bcd} ± 1.87

a = arterial blood, , A = alveolar blood,
v = venous blood, A-a = alveolar – arterial difference
a - v = arterio – venous difference.
Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 6 individuals.

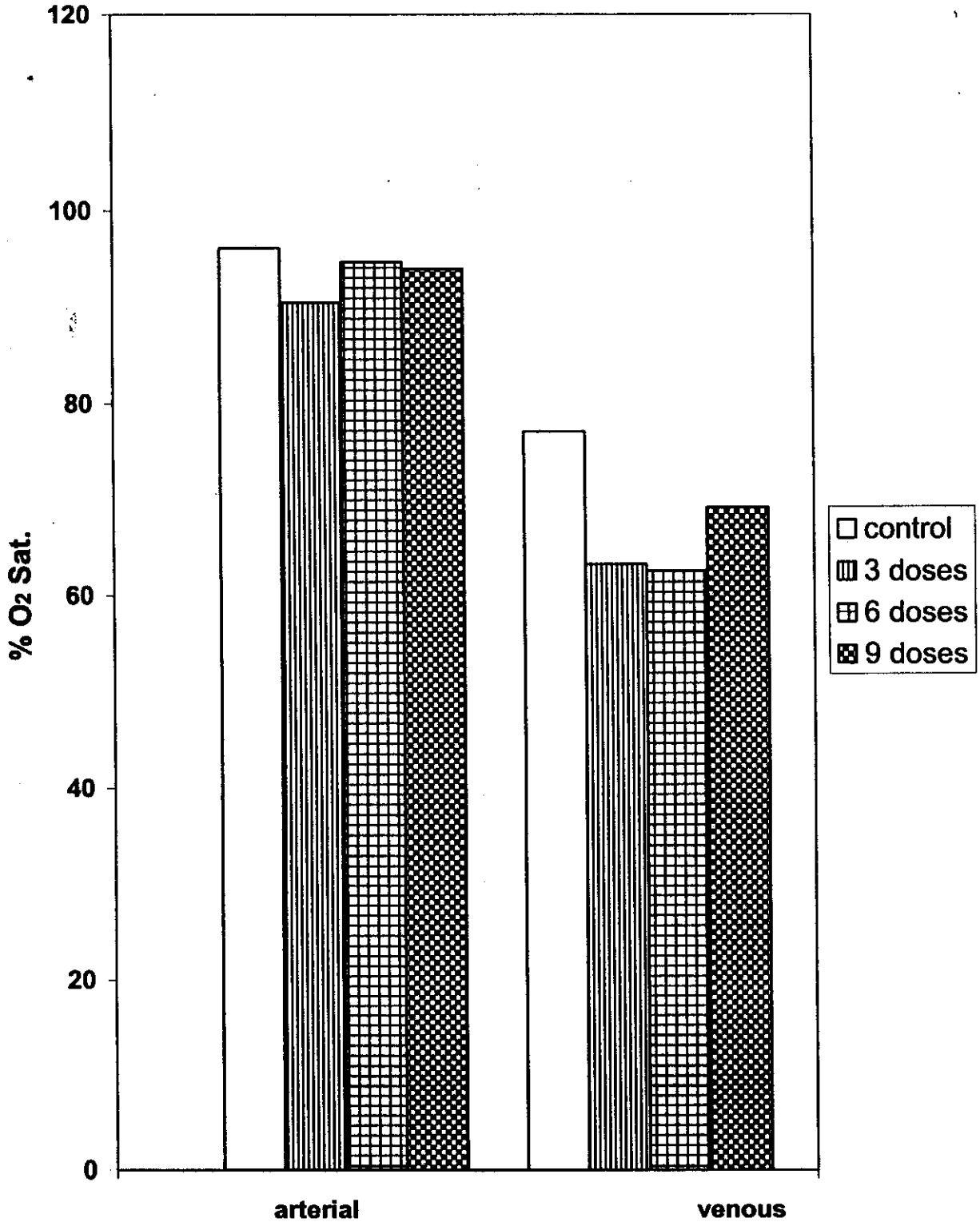

Fig . (42) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on % blood oxygen saturation (% O_2 Sat.) of pigeon.

significantly decreased as compared to those of control group. The percentage arterio-venous difference of percent O_2 saturation (%(a-v) O_2 sat.) after at 3, 6 and 9 doses of propoxur administration was increased significantly compared to that of control group .

Carbon dioxide partial pressure of arterial and venous blood (P_aCO_2 & P_vCO_2 in mm Hg) of pigeons treated with propoxur after 3 , 6 and 9 doses (1/10 LD_{50} each) were significantly higher than that of control pigeons group, the percentage arterio-venous difference of carbon dioxide partial pressure ($\%P_{(a-v)}CO_2$) was significantly increased after 3 doses and significantly decreased after 9 doses administration as compared to that of control pigeons.

2. Blood Acid-Base Status : -

Table (11) and figures (44, 45, 46, 47 & 48) illustrate the effects of repeated oral doses of proxour (1/10 LD_{50} each) on blood acid-base status parameter of pigeons after administration of 3, 6 and 9 doses compared to those of control group.

The pH value of arterial and venous blood of pigeons treated with 3 , 6 and 9 doses of propoxur (1/10 LD_{50} each) were exhibited significantly lower values compared to those of the control pigeons group . The percent arterio-venous difference of pH was significantly lower after 3 doses, significantly higher after 9 doses and non-significantly changes after 6 doses compared with the value of the control pigeons group (Table 11 and Figure 44).

Arterial blood bicarbonate (HCO_3^-), total carbon dioxide (TCO_2) and base excess(BE) were found to be significantly lower in the treated pigeon groups than in control one after administration of 3, 6 and 9 doses of propoxur (1/10 LD_{50} each). Venous blood bicarbonate and total carbon dioxide were

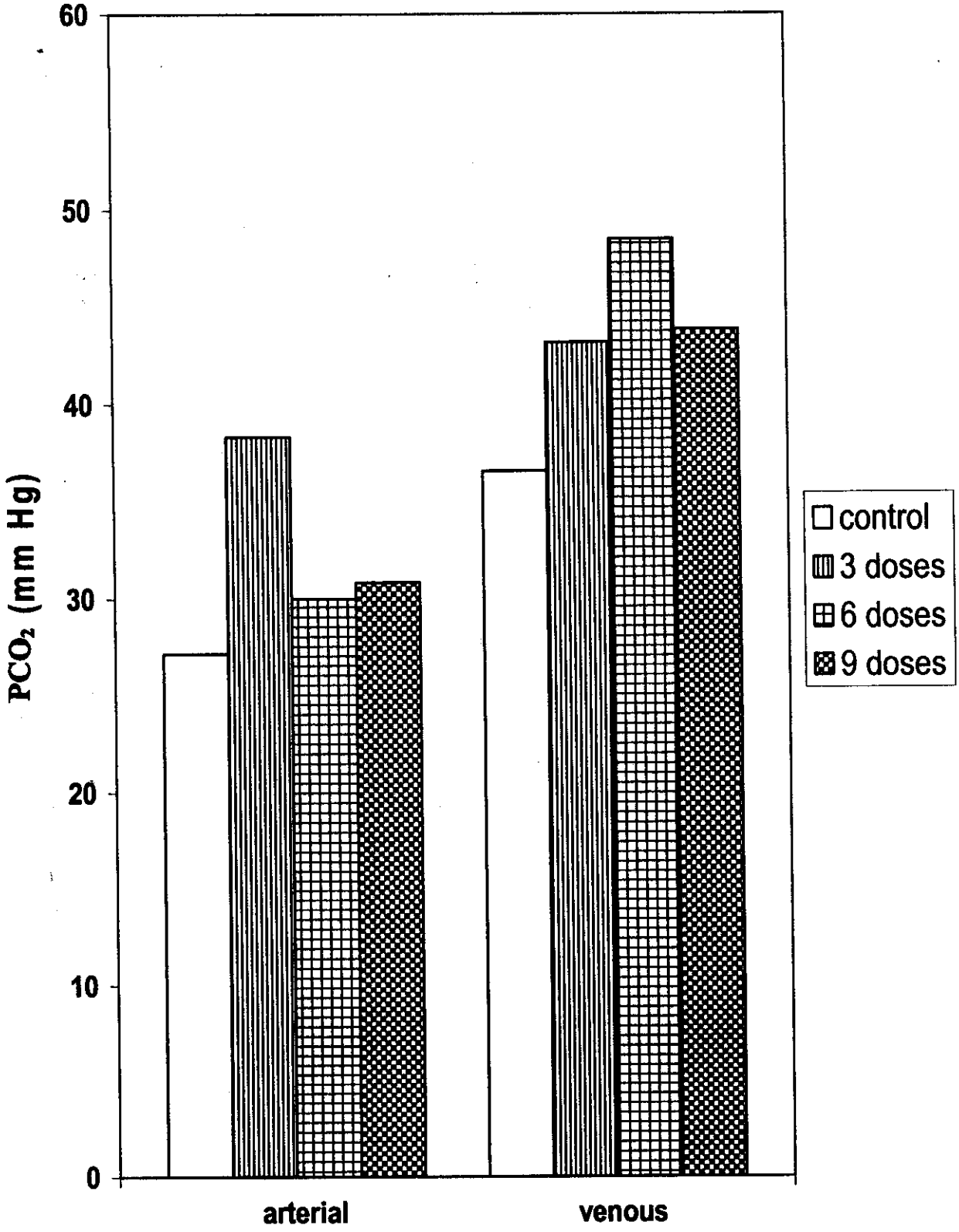

Fig . (43) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on blood carbon dioxide partial pressure (PCO_2 in mmHg) of pigeon.

Table (11) : Effect of a repeated (3, 6and 9)oral dose (1/10 LD_{50}) of propoxur on blood acid– base status parameters of pigeon.

Parameter Mean ± SE		Number of oral doses			
		Control 3	*3*	*6*	*9*
pH (Unit)	a	7.49 $^{a'bcd}$ ± 0.02	7.39 $^{a'b}$ ± 0.02	7.36 $^{a'c}$ ± 0.03	7.42 $^{a'd}$ ± 0.01
	v	7.36 $^{a'bcd}$ ± 0.01	7.30 $^{a'bcd}$ ± 0.01	7.24 $^{a'bc}$ ± 0.02	7.20 $^{a'bd}$ ± 0.02
	% (a-v)	1.76 $^{a'bd}$ ± 0.06	1.13 $^{a'bcd}$ ± 0.09	1.74 ^{bcd} ± 0.16	2.90 $^{a'bcd}$ ± 0.25
(HCO_3^-) (mM/L)	a	27.25 $^{a'bcd}$ ± 0.52	22.40 $^{a'b}$ ± 0.73	23.55 $^{a'c}$ ± 0.65	21.78 $^{a'd}$ ± 0.89
	v	28.77 $^{a'bd}$ ± 1.15	22.55 $^{a'bc}$ ± 0.36	26.27 ^{bc} ± 1.23	25.23 $^{a'd}$ ± 0.84
	% (a-v)	-5.08 $^{a'bcd}$ ± 0.20	-2.02 $^{a'bcd}$ ± 0.41	-14.05 $^{a'bc}$ ± 1.20	-15.97 $^{a'bd}$ ± 0.66
TCO_2 (mM/L)	a	29.28 $^{a'bcd}$ ± 0.61	24.63 $^{a'b}$ ± 1.46	24.48 $^{a'c}$ ± 0.63	22.72 $^{a'd}$ ± 0.92
	v	30.33 $^{a'bd}$ ± 1.16	23.90 $^{a'bc}$ ± 0.38	27.77 ^{bc} ± 1.24	25.80 $^{a'd}$ ± 1.35
	% (a-v)	-5.47 $^{a'cd}$ ± 0.61	-1.65 ^{bcd} ± 1.96	-13.28 $^{a'bc}$ ± 1.22	-13.73 ^{bd} ± 1.13
BE. (mM/L)	a	1.40 $^{a'bcd}$ ± 1.26	-2.87 $^{a'b}$ ± 0.16	-4.25 $^{a'c}$ ± 0.96	-2.67 $^{a'd}$ ± 0.63
	v	-4.88 $^{a'b}$ ± 0.17	-6.08 ± 0.46	-7.35 $^{a'b}$ ± 0.58	-5.63 ± 1.15
	% (a-v)	46.37 $^{a'bcd}$ ± 14.50	-111.93 $^{a'bd}$ ± 7.24	-98.48 ^{ac} ± 16.33	-75.68 ^{abd} ± 3.94
$\frac{(HCO_3^-)}{\alpha\ PCO_2}$	a	34.84 $^{a'bcd}$ ± 2.52	19.51 $^{a'bc}$ ± 0.52	26.3 ^{abc} ± 1.18	23.57 ^{ad} ± 0.53
	v	26.32 $^{a'bcd}$ ± 1.10	17.58 $^{a'b}$ ± 0.85	18.15 ^{ac} ± 1.04	19.16 ^{ad} ± 0.90
	% (a-v)	29.48 $^{a'bcd}$ ± 0.21	11.44 $^{a'bcd}$ ± 0.49	34.02 ^{abcd} ± 0.60	18.77 ^{abcd} ± 1.59
$\frac{\text{Log PCO2}}{\text{pH}}$	a	0.19 $^{a'bcd}$ ± 0.004	0.22 $^{a'bcd}$ ± 0.002	0.20 ^{abc} ± 0.002	0.20 ^{abd} ± 0.002
	v	0.213 $^{a'bcd}$ ± 0.002	0.224 $^{a'bc}$ ± 0.003	0.234 ^{abc} ± 0.002	0.23 ^{ad} ± 0.002
	% (a - v)	-11.87 $^{a'bc}$ ± 0.53	-3.58 $^{a'bcd}$ ± 1.04	-16.83 ^{abcd} ± 1.01	-14.12 ^{bcd} ± 0.96

a = arterial blood , a - v = arterio – venous difference .

v = venous blood,

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).

All data are mean of 6 individuals.

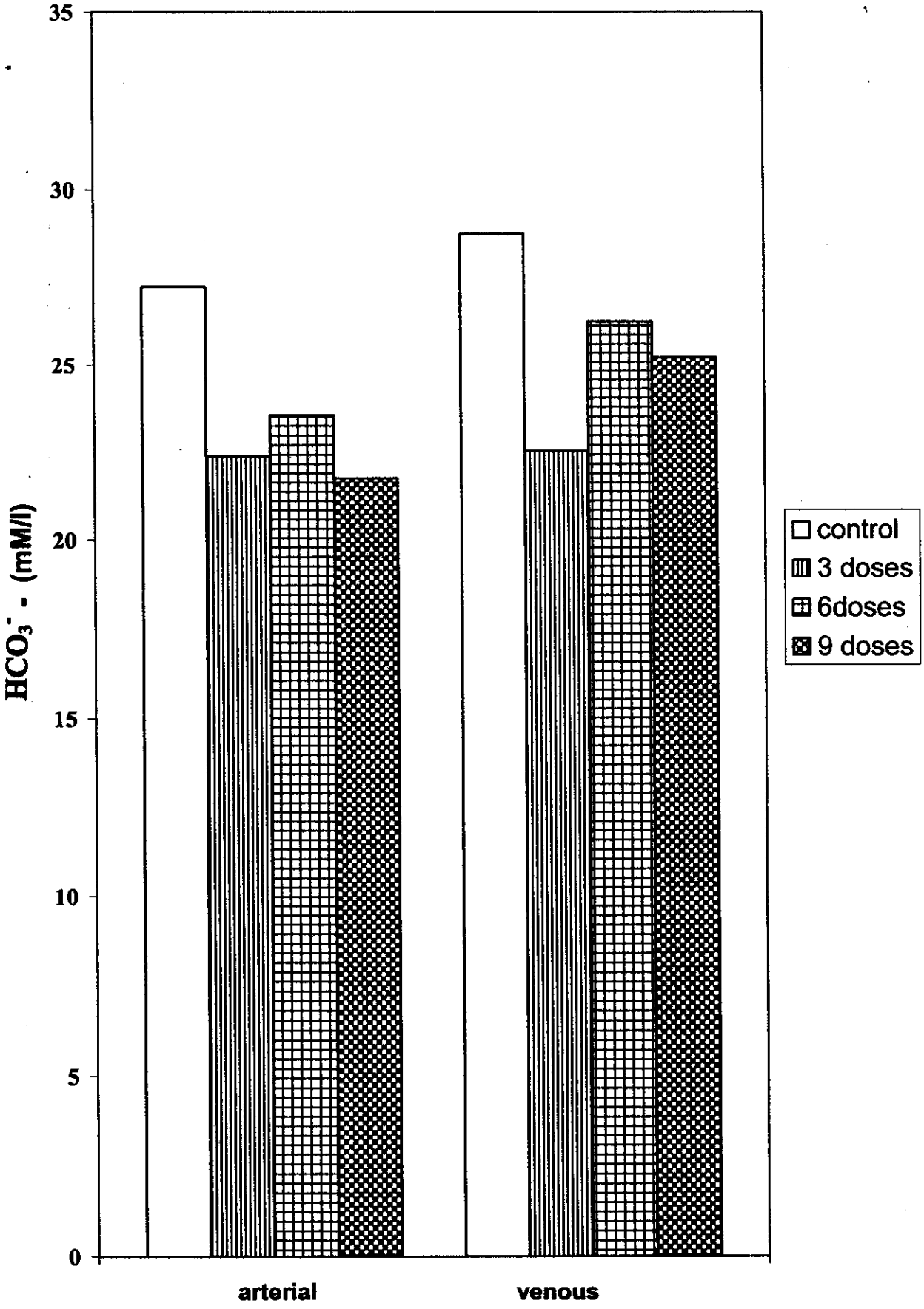

Fig . (45) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on blood bicarbonate (HCO_3^- in mM/L) of pigeon.

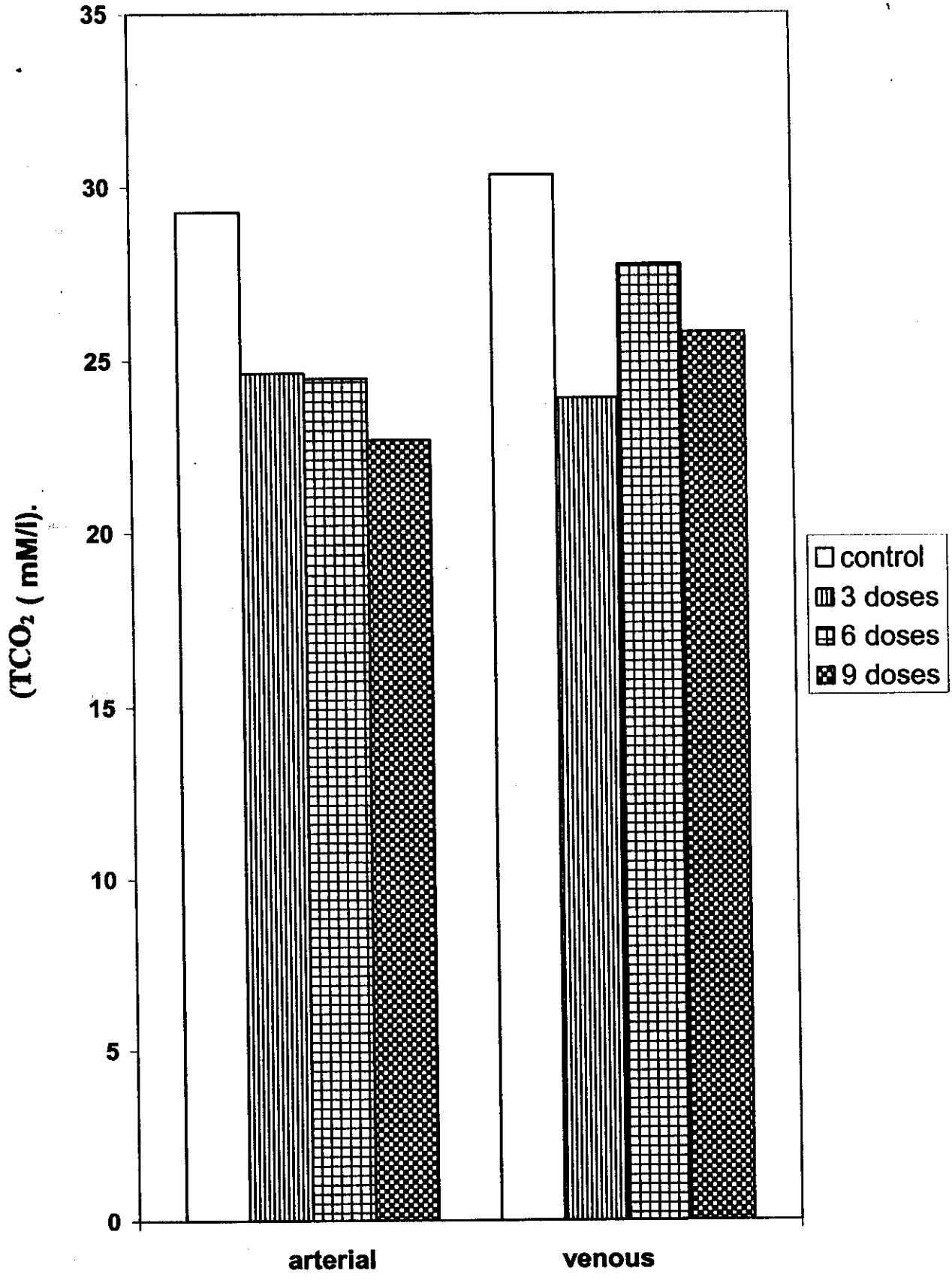

Fig . (46) : Effect of a repeated (3, 6 and 9)oral dose (1/10 LD_{50}) of propoxur on blood total carbon dioxide (TCO_2 in mM/L) of pigeon.

significantly decrease after administration of 3 and 9 doses, and decreased non-significantly after 6 doses as compared to that of the control group . Venous blood base excess was decreased significantly after administration of 6 doses and non-significantly after 3 and 9 doses compared to the control group . The percentage arterio- venous administration of bicarbonate (%(a-v) HCO_3^-) was increased significantly in the 3 doses post-treatment and significantly decrease after 6 and 9 doses as compared to the control group .The percentages arterio- venous difference of total carbon dioxide (%(a-v) TCO_2) was decreased significantly 6 and 9 doses post- treatment, while ,it was insignificantly increased 3 doses post- treatment compared to that of the control group. The percentage arterio-venous difference of base excess (BE) of all treated pigeon groups (3, 6 and 9 doses) were significantly decreased as compared to control pigeons group .

The calculated $HCO_3^-/\alpha PCO_2$ ratios of arterial and venous blood after 3, 6 and 9 doses were significantly lower than that of the control pigeons group. The percentage arterio- venous difference of the calculated $HCO_3^-/\alpha PCO_2$ ratio was found to be significantly lower in treated birds than in control group.

The calculated buffer values (Log PCO_2/pH) of arterial and venous blood were significantly increased in treated pigeons after administration of 3, 6 and 9 doses of propoxur (1/10 LD_{50} each) as compared to that of the control group. The percentage arterio-venous difference of buffer value was significantly increased 3 doses and decreased 6 doses post-treatment, while that of pigeons treated with 9 doses was non-significantly decreased as compared to that control pigeons group.

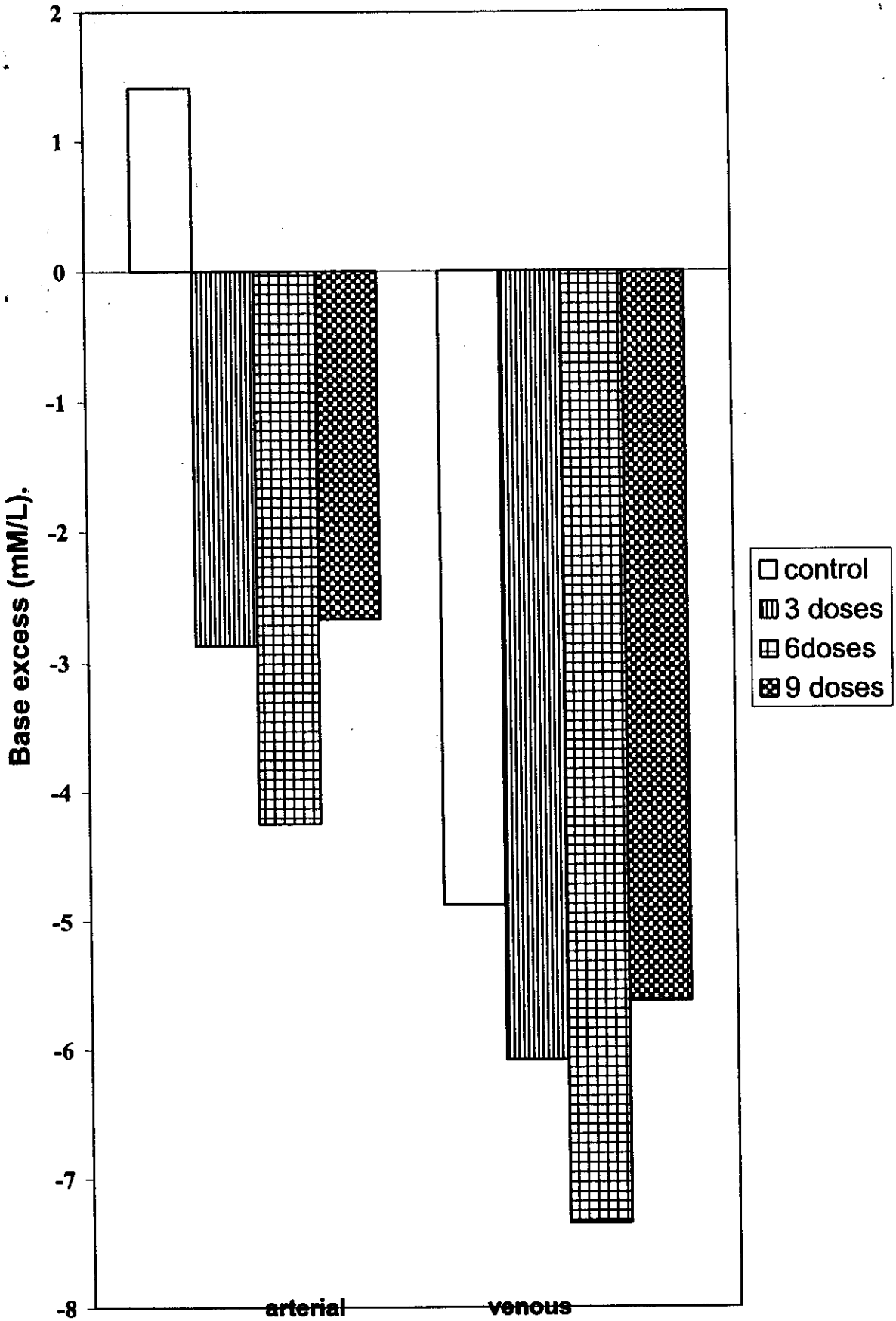

Fig . (47) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on blood base excess (mM/L) of pigeon .

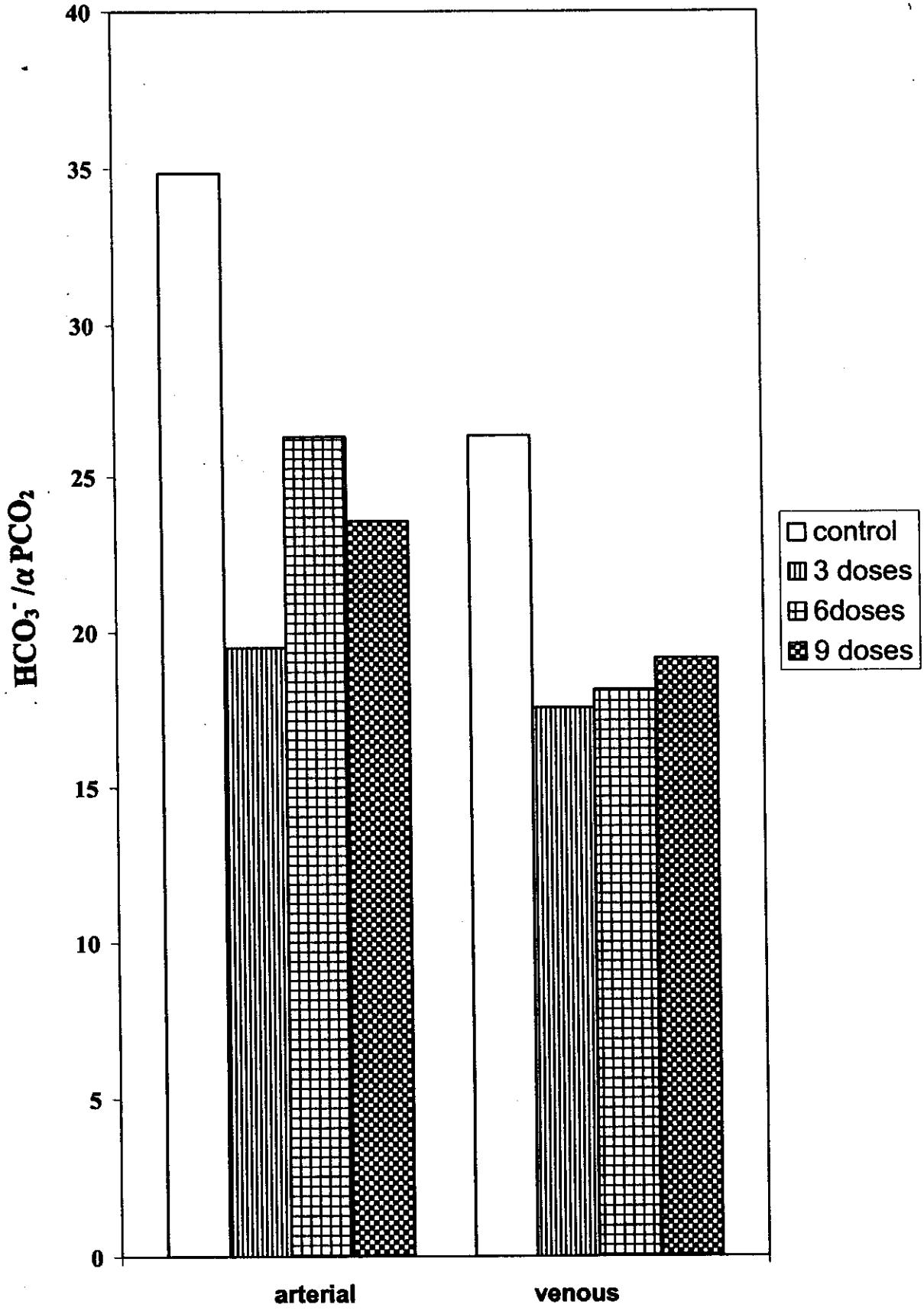

Fig . (48) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on blood $HCO_3^- / \alpha PCO_2$ of pigeon .

4. Blood Oxygen Equilibrium Curve (OEC):-

The blood oxygen equilibrium curve (OEC) of pigeon groups post-treatment with 3, 6 and 9 oral doses (1/10 LD_{50} each) of propoxur were found to be shifted to the left after 3 doses and shifted to the right after 6 and 9 doses in relation to that of the control pigeons group. The blood oxygen half saturation pressure (P_{50}) as a measure of blood oxygen affinity found to be 28.5, 26.2, 29 and 30.5 mm Hg. in control and 3, 6 and 9 doses post-treatment, respectively with significant differences (Table 12 & Figure 49) . Hill's constant (n value in Hill's equation) was found to be 2.5, 3.8, 3.68 and 3.45 for control and 3, 6 and 9 doses post-treatment, respectively (Table 12 & Figure 50).

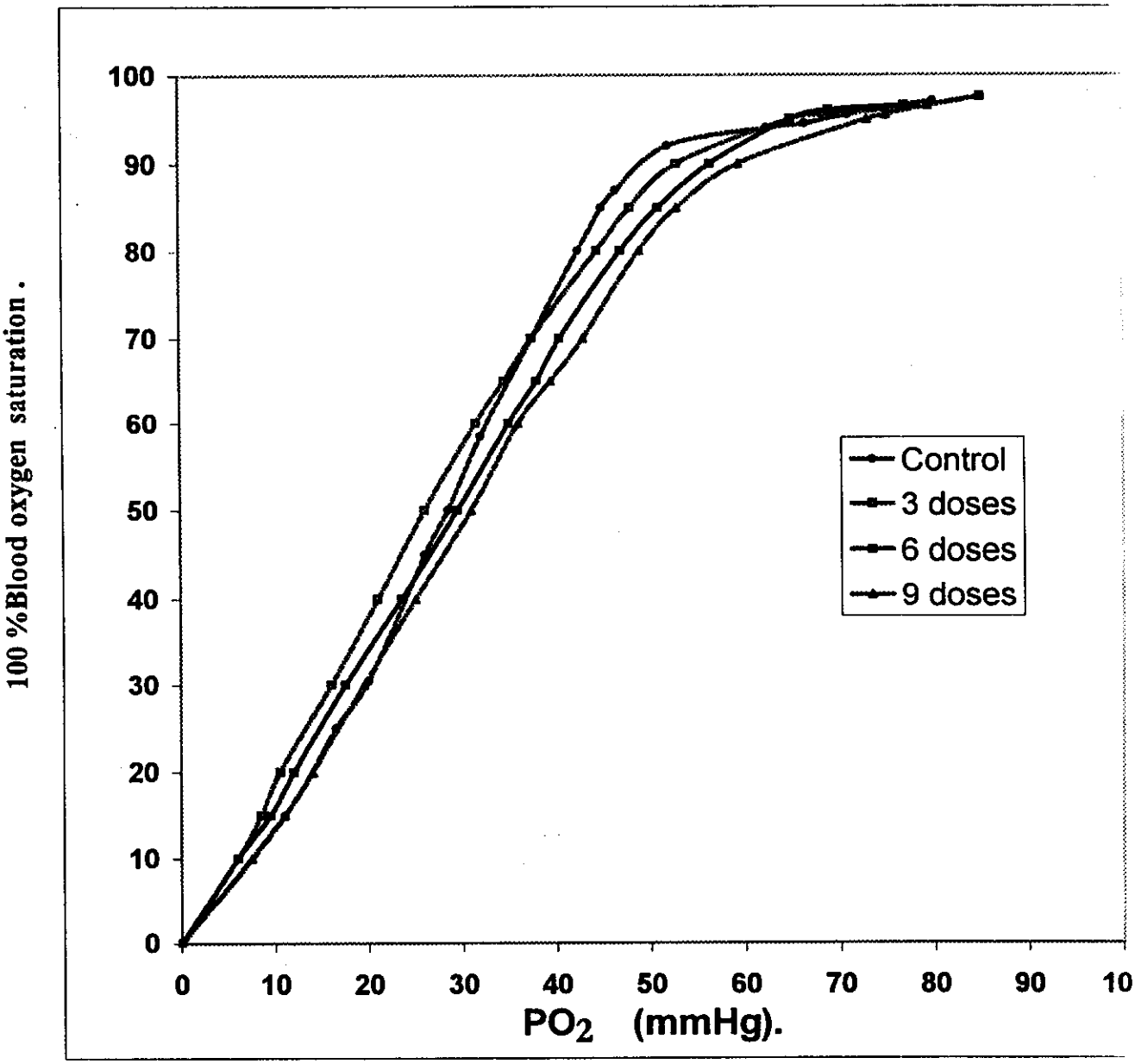

Fig .(49): Blood oxygen equilibrium curve of pigeon (*Columba livia domestica*) treated with a repeated (3,6 and 9) oral dose (1/10 LD_{50}) of propoxur.

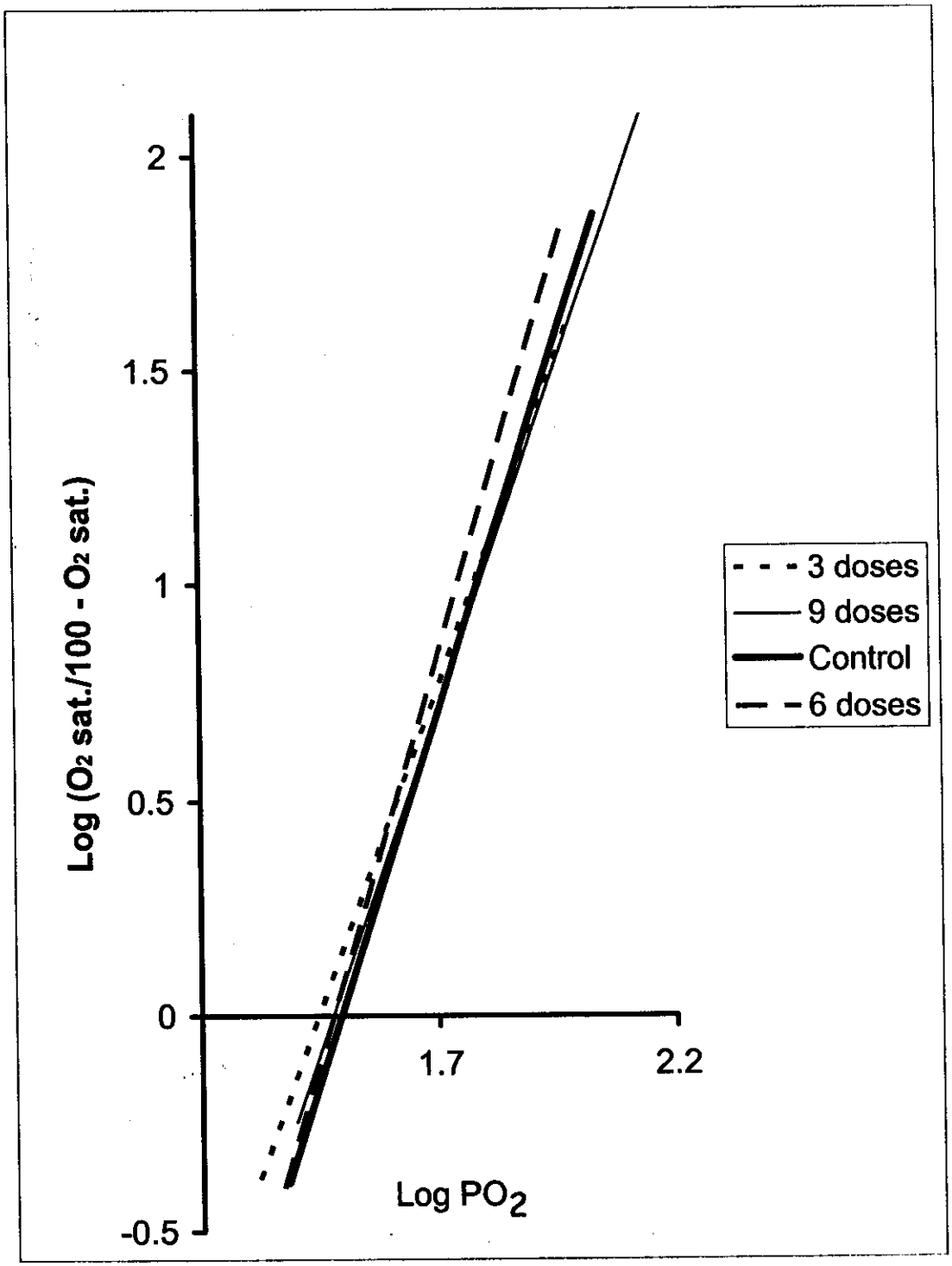

Fig. (50) : Hill's plot of pigeon (*Columba livia domestica*) treated With a repeated (3,6 and 9) oral doses (1/10 LD_{50}) of propoxur .

Table (12) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on blood oxygen half saturation pressure (P_{50}) and Hill's constant (n value) of pigeon.

Parameter Mean ± SE	*Number of oral doses*			
	Control	*3*	*6*	*9*
P_{50} (mm Hg)	28.50^{abd} ± 0.33	26.20^{abcd} ± 0.42	29.00^{bcd} ± 0.49	30.50^{abcd} ± 0.36
n	2.50^{abcd} ± 0.03	3.80^{abd} ± 0.07	3.68^{acd} ± 0.07	3.45^{abcd} ± 0.03

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 6 individuals.

III. Effect of a Repeated Oral Dose (1/10 LD_{50}) of Propoxur on Some Metabolites and Enzymes :

1- Serum Glucose Concentration :-

Effects of a repeated oral dose (1/10 LD_{50}) of propoxur on serum glucose are presented in table (13) and figure (51). Results showed significant increase in serum glucose concentration after 3 doses 399.88 mg/dl and 6 doses 386.78 mg/dl of treatment, respectively compared with that of the control pigeons group (295.80 mg/dl). Non significant changes was observed after 9 doses of treatment (330.74 mg/dl).

2 - Serum Proteins:

a . Serum Total Protein Content:-

Significant elevations of protein contents were noticed for all experimental groups after administration of a repeated oral dose (1/10 LD_{50}) of propoxur (Table 13 and figure 52) . Serum total protein values were 5.24 , 5.40 , and 6.31 g /dl for 3, 6 and 9 doses post- treatment, respectively ,while the control value was 2.84 g/dl .

b. Serum Albumin Concentration :

The data shown in table (13) and figure (53) indicated significant increase in serum albumin in all treated groups with a repeated oral dose (1/10 LD_{50}) of propoxur; after 3 doses (2.40 g/dl), 6 doses (2.53 g/dl), and 9 doses (2.45 g/dl)of treatment as compared to that of control pigeons (1.30 g/dl).

c. Serum Globulins Concentration:-

Results presented in table (13) and figure (54) showed serum globulins concentration (1.54, 2.85, 2.97 and 3.86 g/dl) for controls, 3, 6 and 9 doses

Table (13) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum metabolites of pigeon .

Parameter Mean ± SE	*Number of oral doses*			
	Control	*3*	*6*	*9*
Glucose (mg/dl)	295.80^{abc} ± 7.14	399.88^{abd} ± 9.87	386.78^{acd} ± 20.15	330.74^{bcd} ± 13.63
Total protein (g/dl)	2.84^{abcd} ± 0.16	5.24^{abd} ± 0.07	5.49^{acd} ± 0.09	6.31^{abcd} ± 0.22
Albumin (g/dl)	1.30^{abcd} ± 0.06	2.40^{ab} ± 0.03	2.53^{ac} ± 0.05	2.45^{ad} ± 0.06
Globulins (g/dl)	1.54^{abcd} ± 0.16	2.85^{abd} ± 0.07	2.97^{acd} ± 0.05	3.86^{abcd} ± 0.20
A / G (ratio)	0.88^{ad} ± 0.09	0.84^{bd} ± 0.02	0.85^{cd} ± 0.02	0.64^{abcd} ± 0.04
Total lipids (mg/dl)	1185.00 ± 47.20	1106.20 ± 106.76	1010.40 ± 25.64	1210.66 ± 93.92
Triglycerides (mg/dl)	248.72^{ac} ± 4.56	218.84^{bc} ± 15.31	316.34^{abcd} ± 18.49	220.43^{cd} ± 25.59
Cholesterol (mg/dl)	248.69^{ac} ± 6.01	225.30^{bc} ± 11.34	253.60 ± 12.86	290.53^{abc} ± 19.47

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

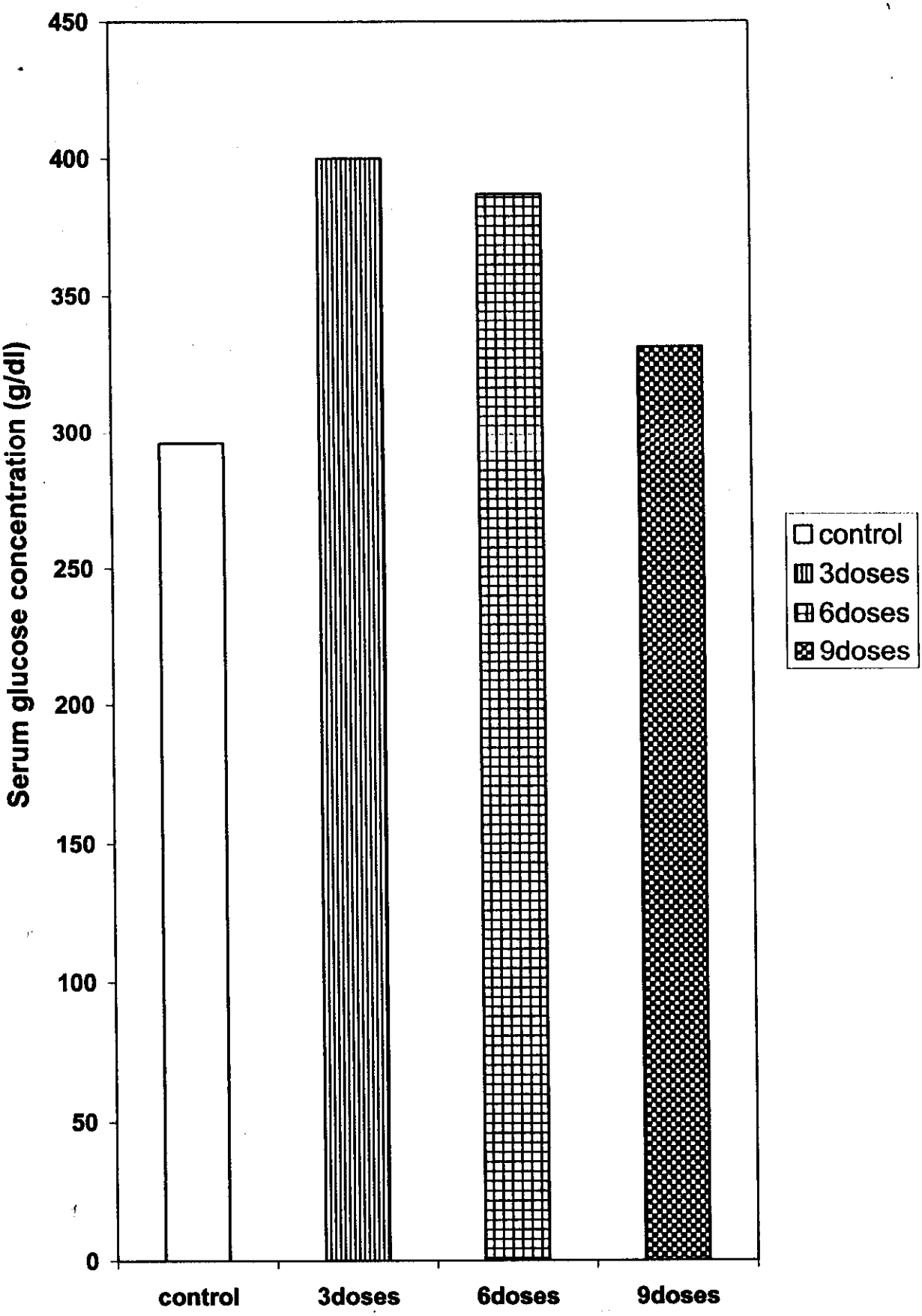

Fig. (51) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum glucose concentration (g/dl) of pigeon.

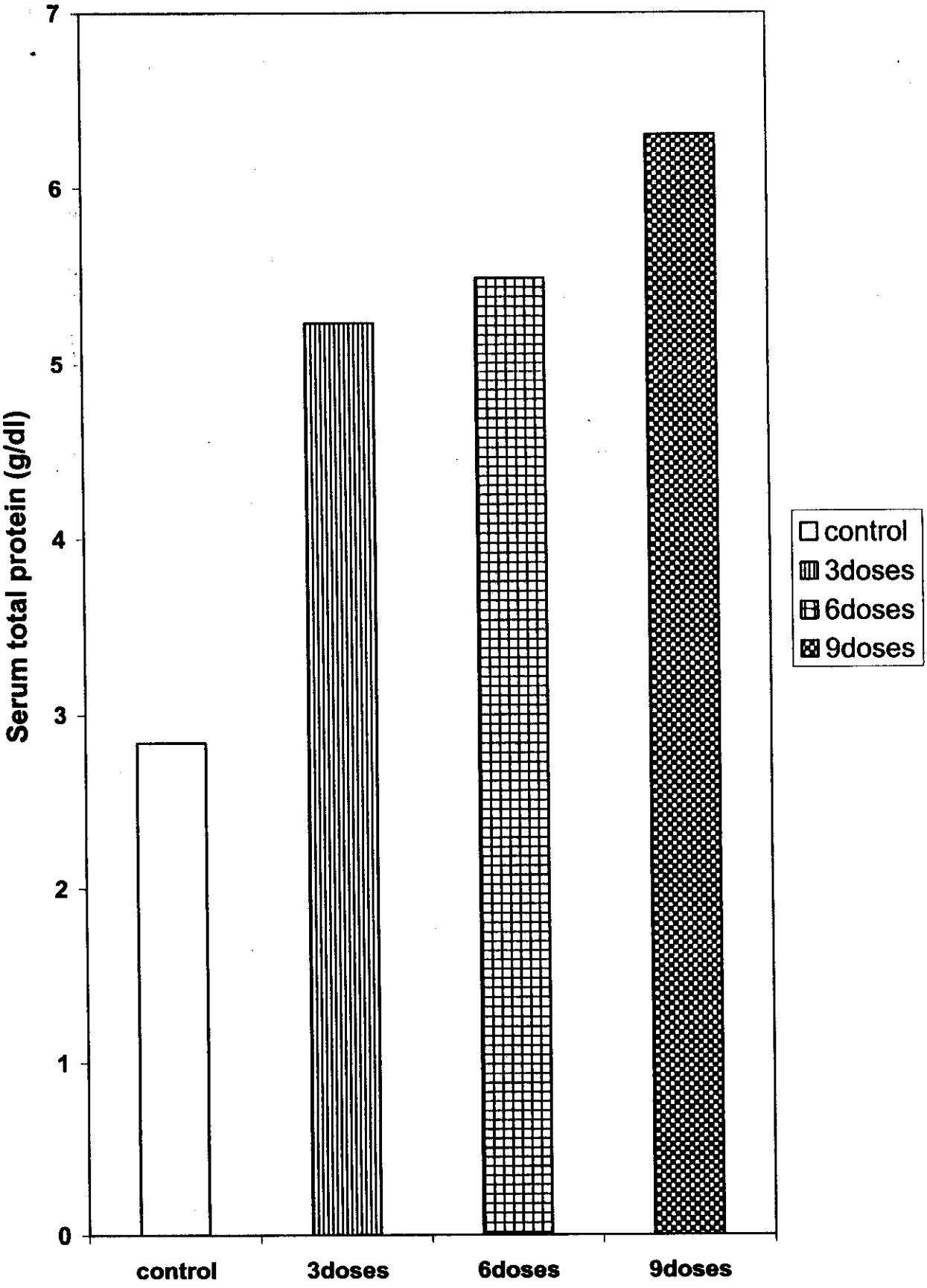

Fig. (52) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum total protein concentration (g/dl) of pigeon.

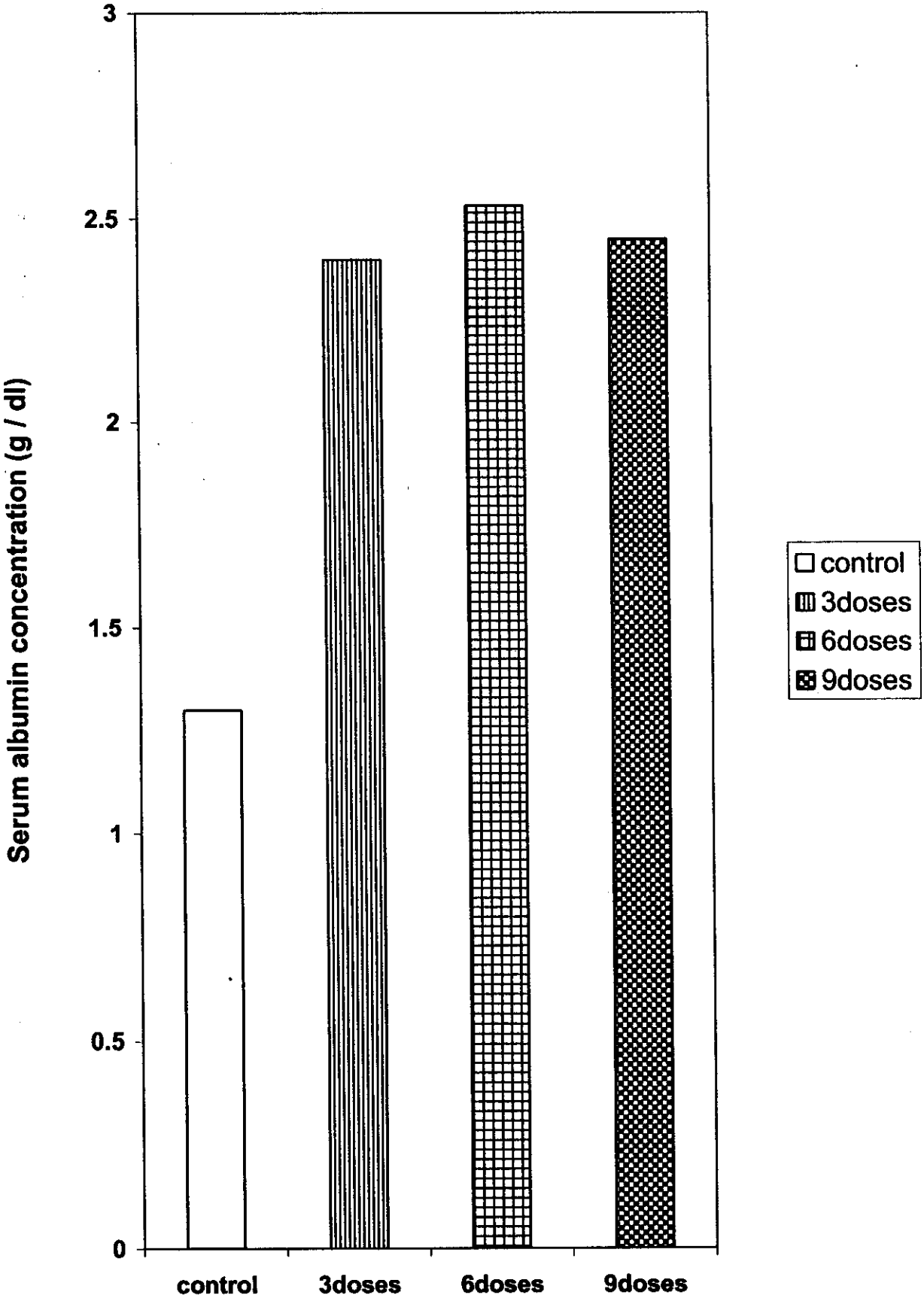

Fig. (53) : Effect of a repeated (3, 6 and 9)oral dose (1/10 LD_{50}) of propoxur on serum albumin concentration (g/dl) of pigeon .

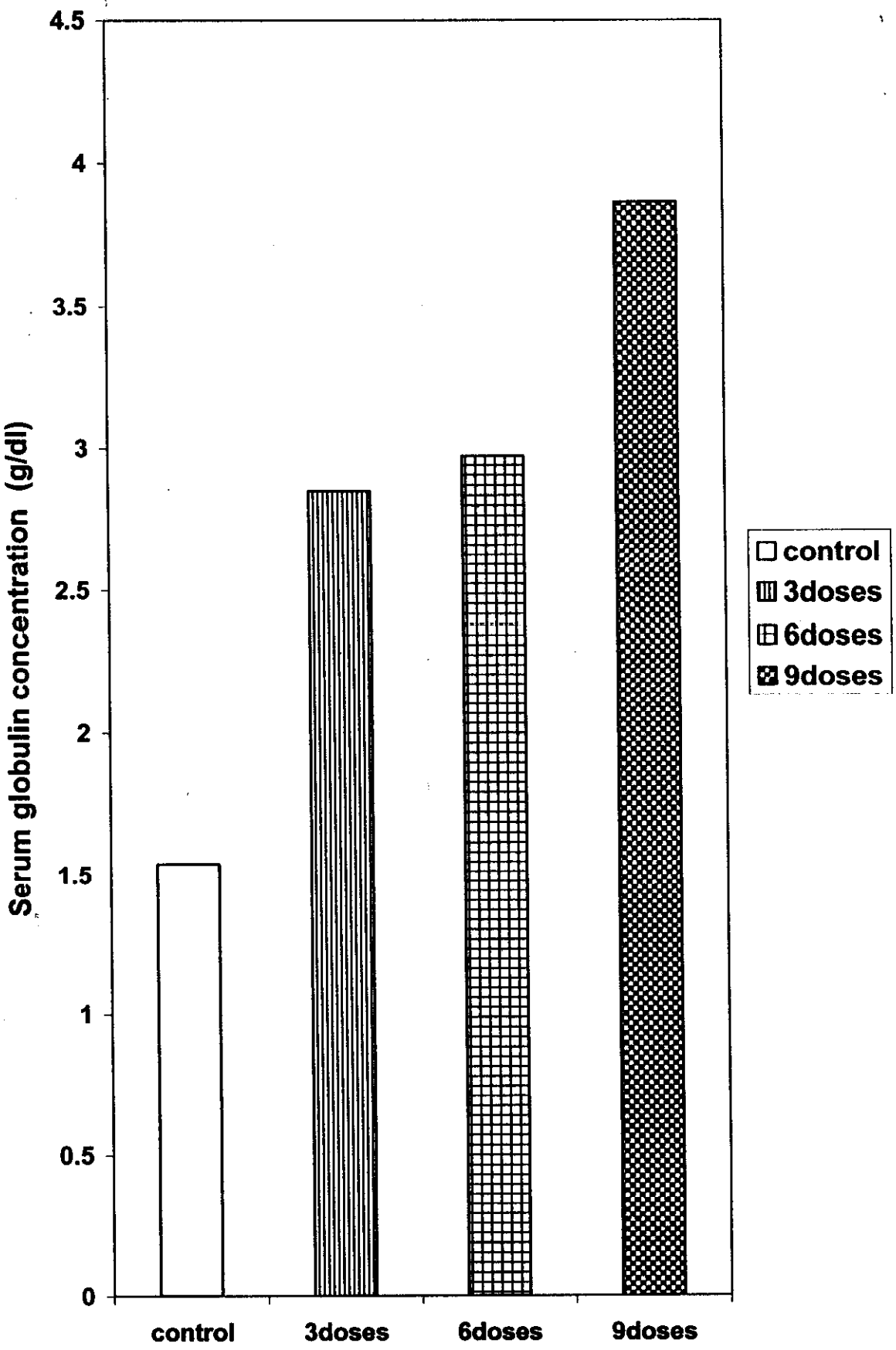

Fig. (54) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum globulin concentration (g/dl) of pigeon .

post-treatment, respectively. Statistical analysis of these data indicated significant increases in serum globulins concentration in all treated pigeon groups as compared with control one (Figure 54).

d. Serum A/G Ratio :

The data obtained are present in table (13) and demonstrated by figure (55). Significant reduction of serum A/G ratio was noticed after 9 doses (0.64) of treatment. Unaltered serum A/G ratio was noticed after 3 doses (0.84) and 6 doses (0.85) of treatment as compared to control pigeons group (0.88).

3 - Serum Total Lipids Concentration :-

The effect administration of a repeated oral dose (1/10 LD_{50}) of propoxur on serum total lipids concentration are shown in table (13) and figure (56). Non significant changes were after 3 doses (106.2 mg/dl), 6 doses (1010.4 mg/dl) and 9 doses (1210.66 mg/dl) of treatment as compared to that of the control group (1185 mg/dl).

4- Serum Triglycerides Content :-

Treatment of pigeons with a repeated oral dose (1/10 LD_{50}) of propoxur caused significant increase in serum triglycerides concentration after 6 doses (316.43 mg/dl) and non -significant changes after 3 doses (218.84 mg/dl) and 9 doses (220.43 mg/dl) compared with control pigeons (248.72 mg/dl), (Table13 & Figure 57) .

5 - Serum Cholesterol Content :-

The data presented in table (13) and demonstrated in figure (58) showed that administration of a repeated oral dose (1/10 LD_{50}) of propoxur to pigeons induced significant increase in serum cholesterol content after 9 doses

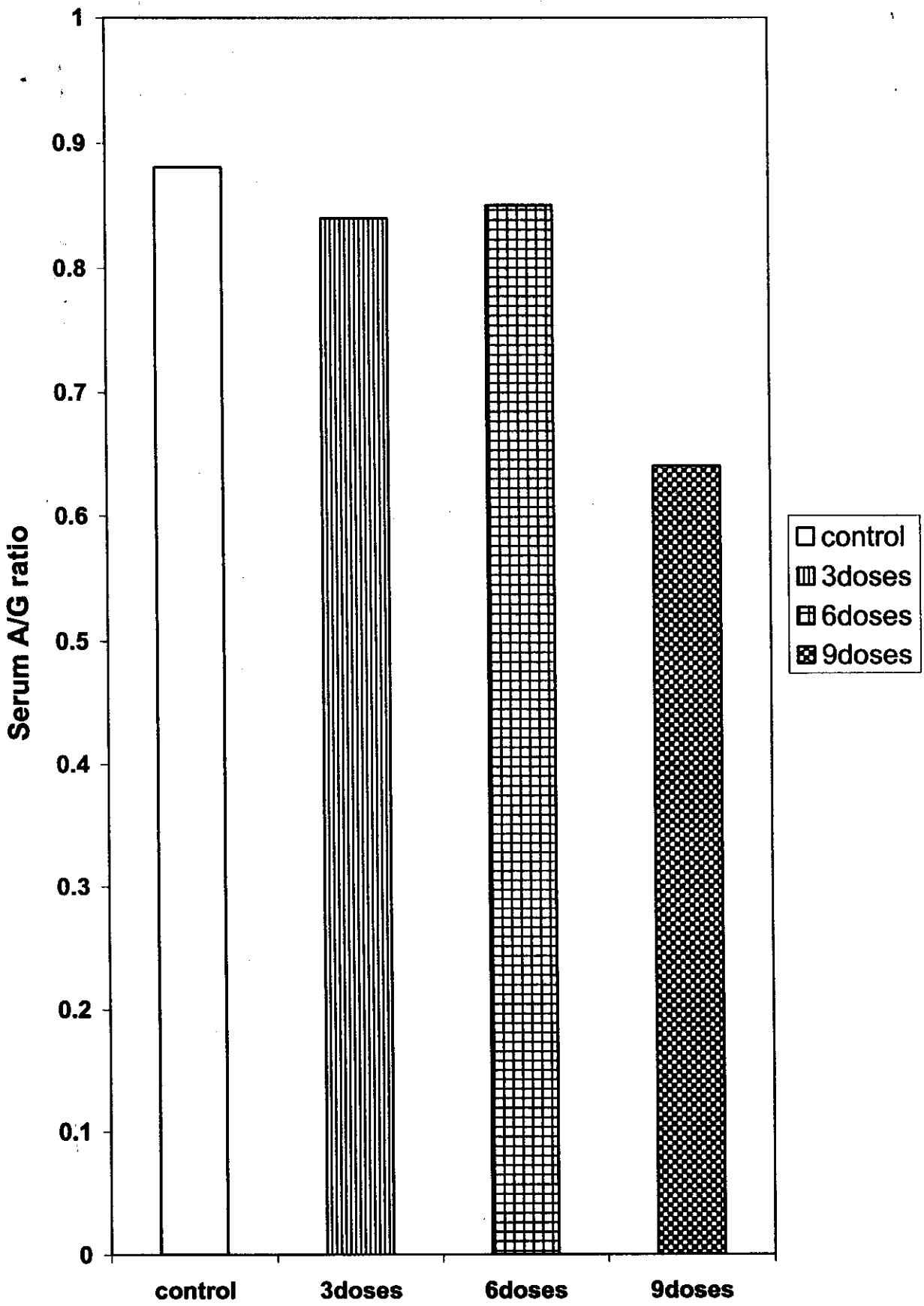

Fig. (55): Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum A/G ratio of pigeon.

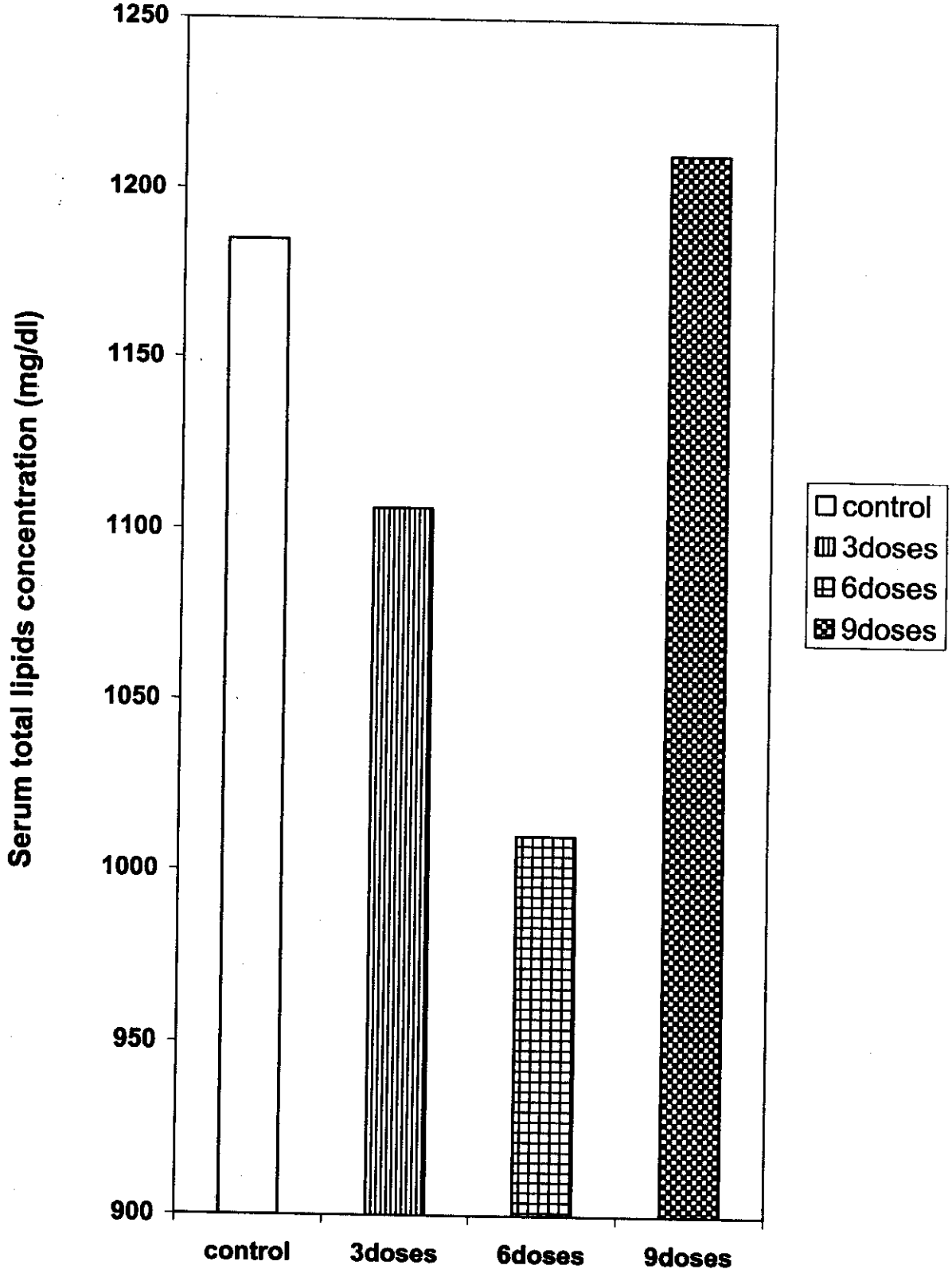

Fig. (56) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum total lipids concentration (mg/dl) of pigeon.

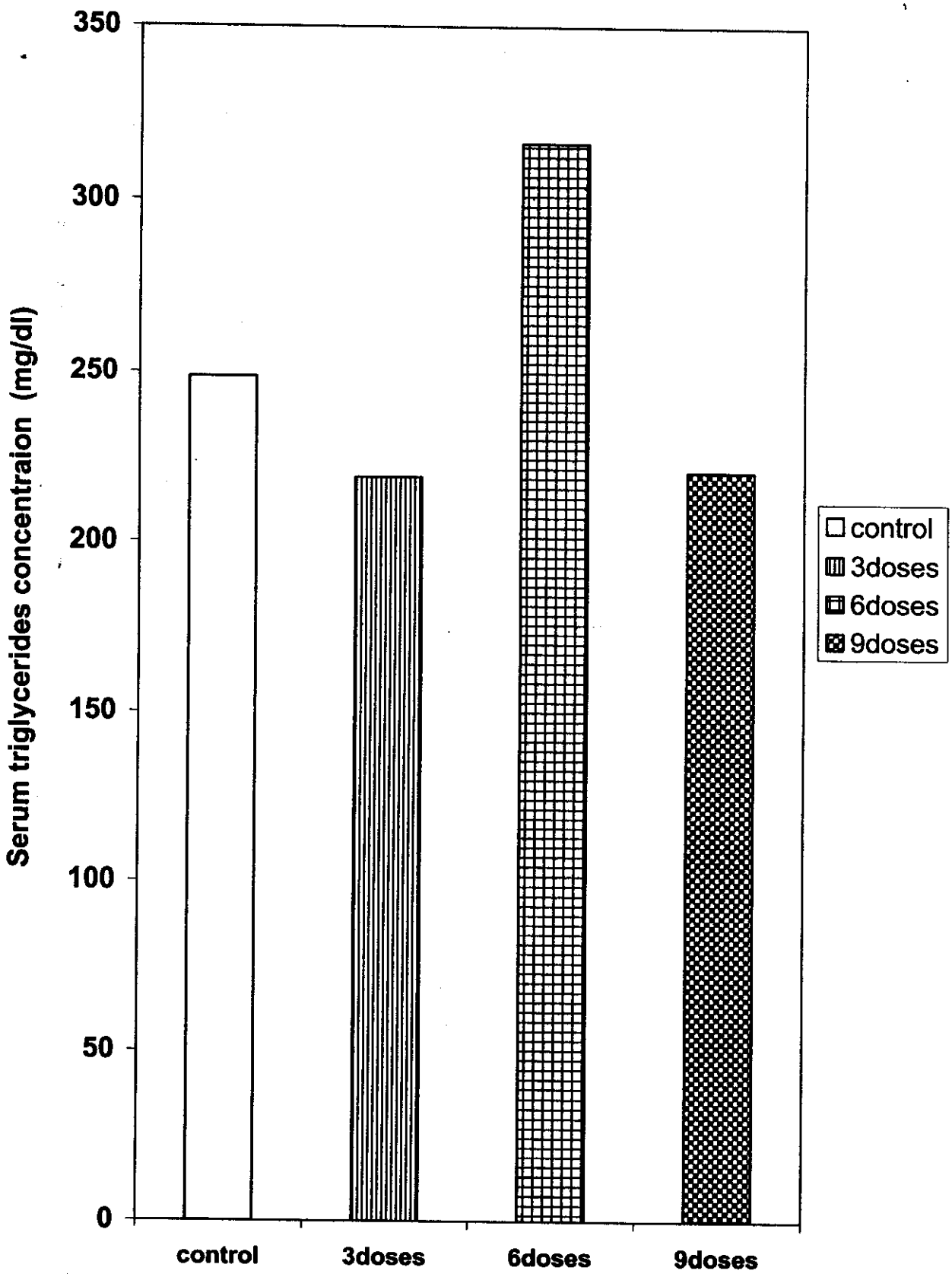

Fig. (57) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum triglycerides concentration (mg/dl) of pigeon .

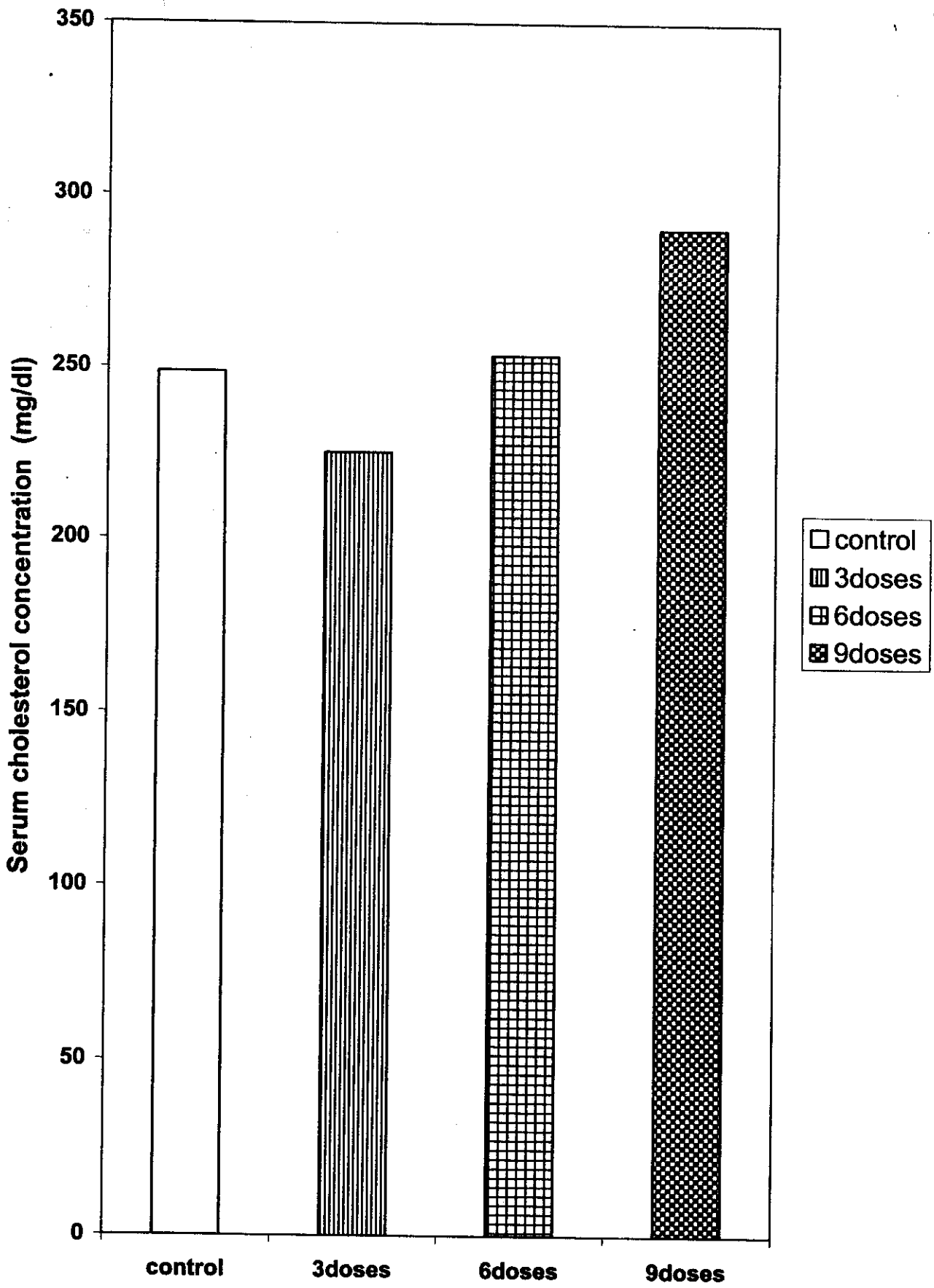

Fig. (58): Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum cholestrol concentration (g/dl) of pigeon .

(290.53 mg/dl) and non-significant changes after 3 doses (225.30 mg/dl) and 6 doses (253.60 mg/dl) of treatment as compared to control pigeons (248.69 mg/dl) .

6 - Serum Transaminase Activities :-

a. Serum Aspartate Amino-Transferase Activity : -

Serum AST activity of control pigeons was 59.40 U/L ,this value was increased significantly to 166.70 U/L and 145.66 U/L after 3 doses, and 6 doses, respectively of treatment with a repeated dose (1/10 LD_{50}) of propoxur. Meanwhile, non- significant change was noticed in serum AST activity after 9 doses (58 U/L) of treatment as compared to the control pigeons (Table 14 & Figure 59) .

b. Serum Alanine Amino- Transferase Activity :-

Variations in serum ALT activity in different experimental pigeon groups are shown in table (14) and figure (60). Significant increases in serum ALT activity were observed in pigeons treated with a repeated dose (1/10 LD_{50}) of propoxur after 3doses (134.84 U/L), 6 doses (137.84 U/L) and 9 doses (205.20 U/L) of treatment when compared with control pigeons group (46 U/L).

7 - Serum Urea Concentration:-

Serum urea concentration was increased significantly in pigeons treated with a repeated dose (1/10 LD_{50}) of propoxur; after 3 doses (39.04 mg/dl), 6 doses (41.10 mg/dl) and 9 doses as compared to control pigeons group (6.72 mg/dl), (Table 15 & Figure 61) .

Table (14) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum aspartate amino – transferase (sAST) and serum alanine amino–transferase (sALT) activities of pigeon .

Parameter Mean ± SE	*Number of oral doses*			
	Control	*3*	*6*	*9*
sAST (U/l)	59.40 ^{abc} ± 3.25	166.70 ^{abcd} ± 4.78	145.66 ^{abcd} ± 9.02	58.00 ^{bcd} ± 5.62
sALT (U/l)	46.00 ^{abcd} ± 1.41	134.84 ^{abd} ± 0.72	137.77 ^{acd} ± 2.99	205.20 ^{abcd} ± 21.21

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

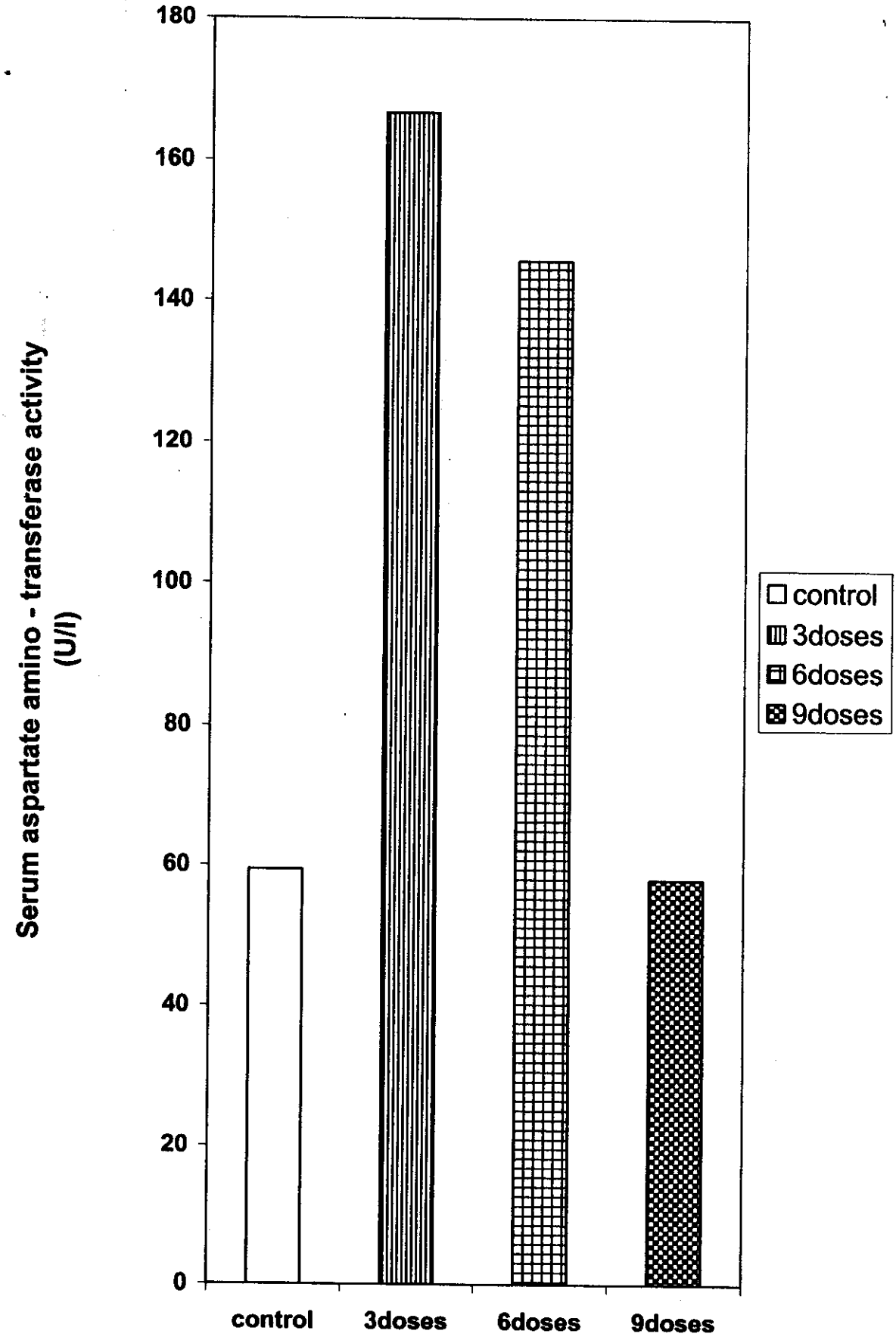

Fig (59) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum aspartate amino-transferase activity (U/l) of pigeon .

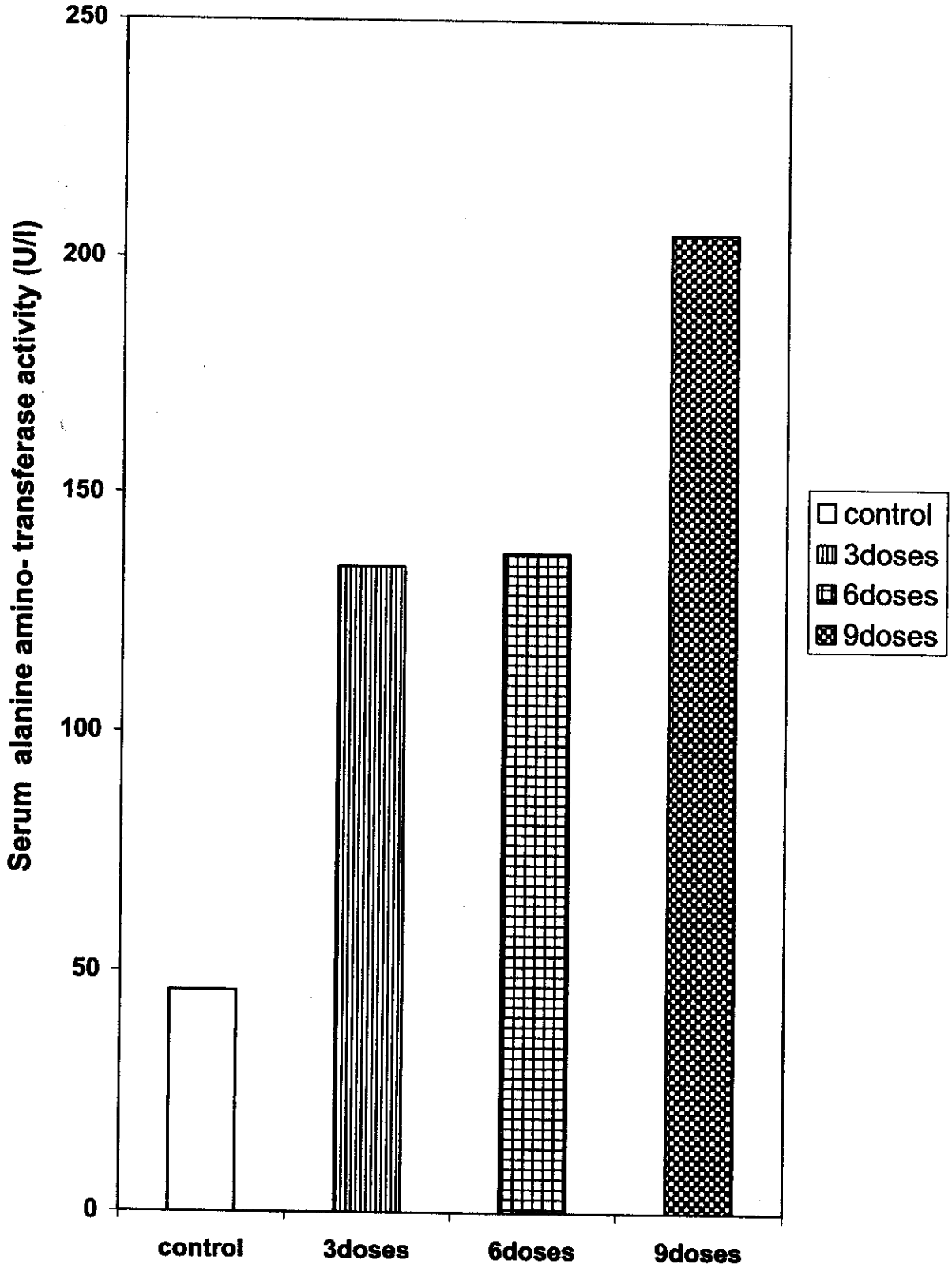

Fig. (60) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum alanine amino - transferase activity (U/l) of pigeon.

Table (15) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum urea, uric acid and creatinine concentrations (mg/dl) of pigeon .

Parameter Mean ± SE	*Number of oral doses*			
	Control	*3*	*6*	*9*
Urea (mg/dl)	$6.72^{abcd} \pm 0.23$	$39.04^{ab} \pm 0.77$	$41.1^{acd} \pm 0.99$	$38.01^{acd} \pm 1.13$
uric acid (mg/dl)	$5.68^{acd} \pm 0.10$	$6.05^{bcd} \pm 0.32$	$7.50^{abc} \pm 0.31$	$6.84^{abd} \pm 0.27$
Creatinine (mg/dl)	1.63 ± 0.02	1.63 ± 0.02	1.66 ± 0.02	1.66 ± 0.01

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

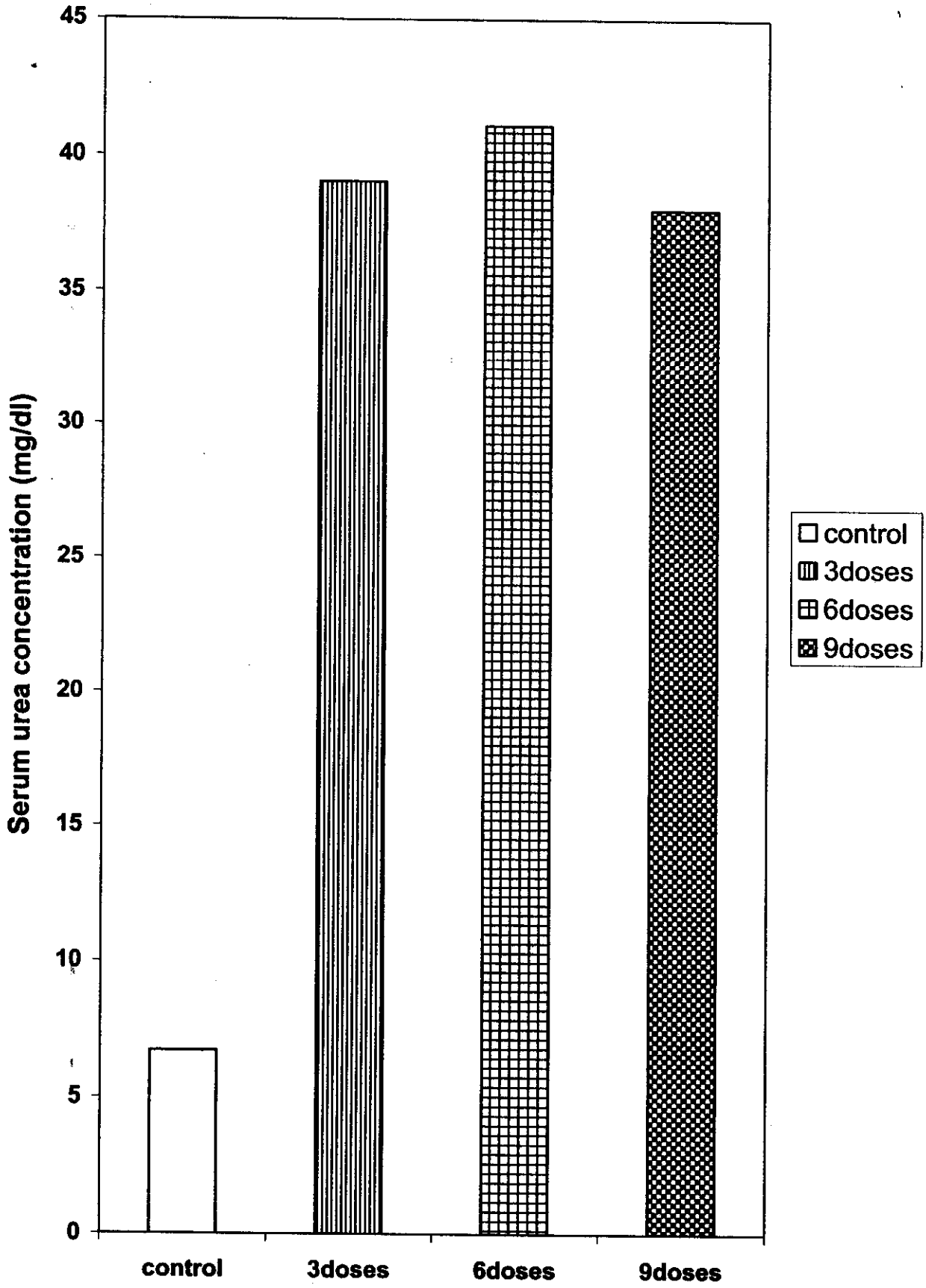

Fig. (61) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum urea concentration (mg/dl) of pigeon .

8 - Serum Uric Acid Concentration: -

Variations in serum uric acid concentration .in pigeons treated with a repeated dose (1/10 LD_{50}) of propoxur; after 3, 6 and 9 doses compared with control pigeons group are present in table (15) and figure (62). Significant increase in serum uric acid concentration was recorded after 6 doses (7.50 mg/dl) and 9 doses (6.84 mg/dl) of treatment when compared with control group (5.68 mg/dl). Non-significant change was observed in serum uric acid concentration after 3 doses (6.05 mg/dl) of treatment.

9 - Serum Creatinine Concentration:-

Non-significant changes were observed in serum creatinine concentration in the treated groups; 3 doses (1.63 mg/dl), 6 doses (1.66 mg/dl) and 9doses (1.66 mg/dl) as compared to that of the control pigeons group (1.63 mg/dl). These data are present in table (15) and figure (63).

10 - Serum Ions :

a. Serum Sodium Ions Concentration :

Serum sodium ions concentration showed significant increase when pigeons were treated with a repeated oral dose of propoxur (1/10 LD_{50}); after 3 doses (157.34 µeq./L), 6 doses (164.62 µeq./L), and 9 doses (162.66 µeq./L) as compared to that of the control group (144.80 µeq./L), (Table 16 & Figure 64).

b. Serum Potassium Ions Concentration :

Non significant changes were observed in serum potassium ions concentration of the control group (2.62 µeq./L) after treatment with 3 doses (2.42 µeq./L) and 9 doses (3.2 µeq./L), while significant increase was

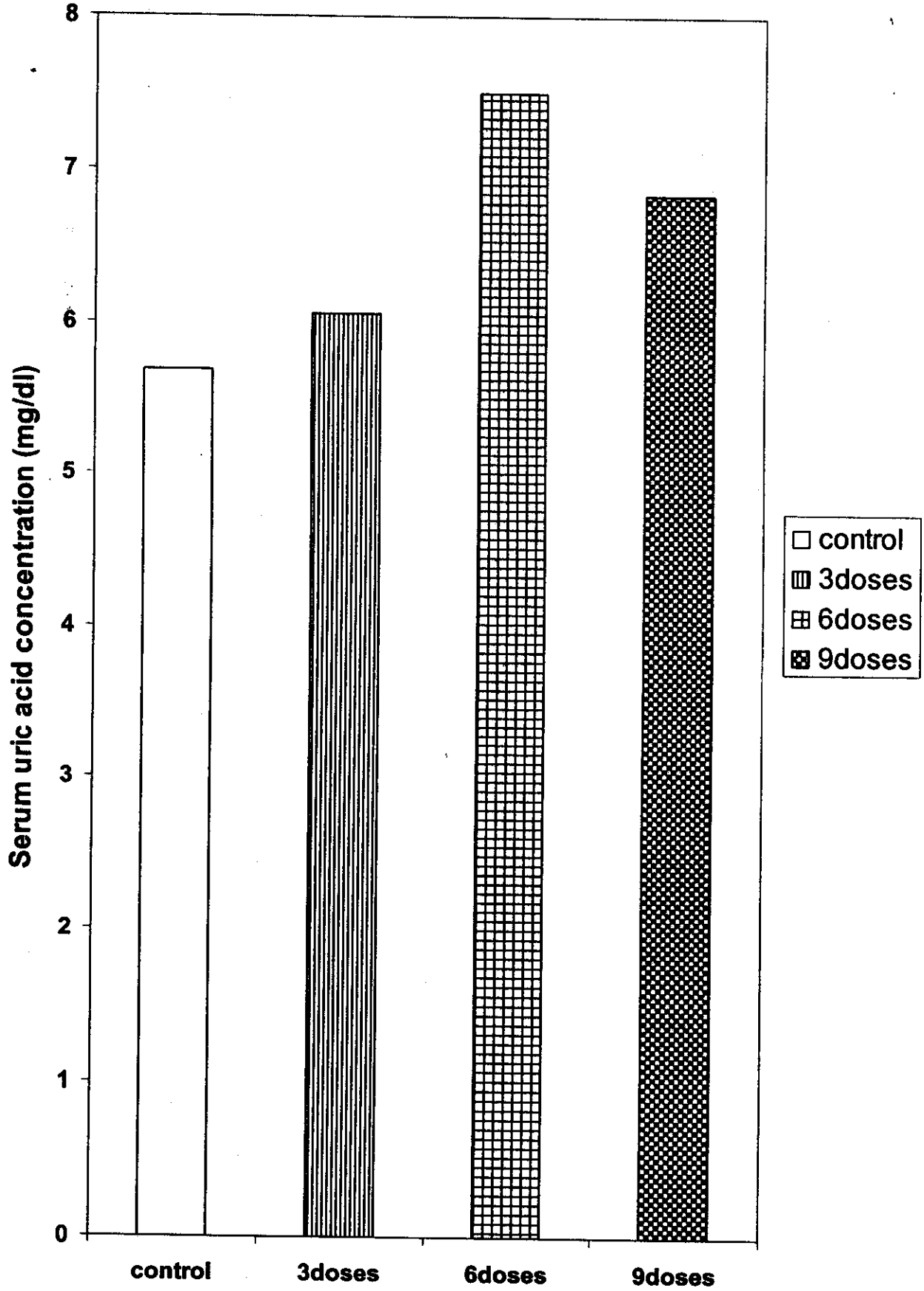

Fig. (62): Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum uric acid concentration (mg/dl) of pigeon .

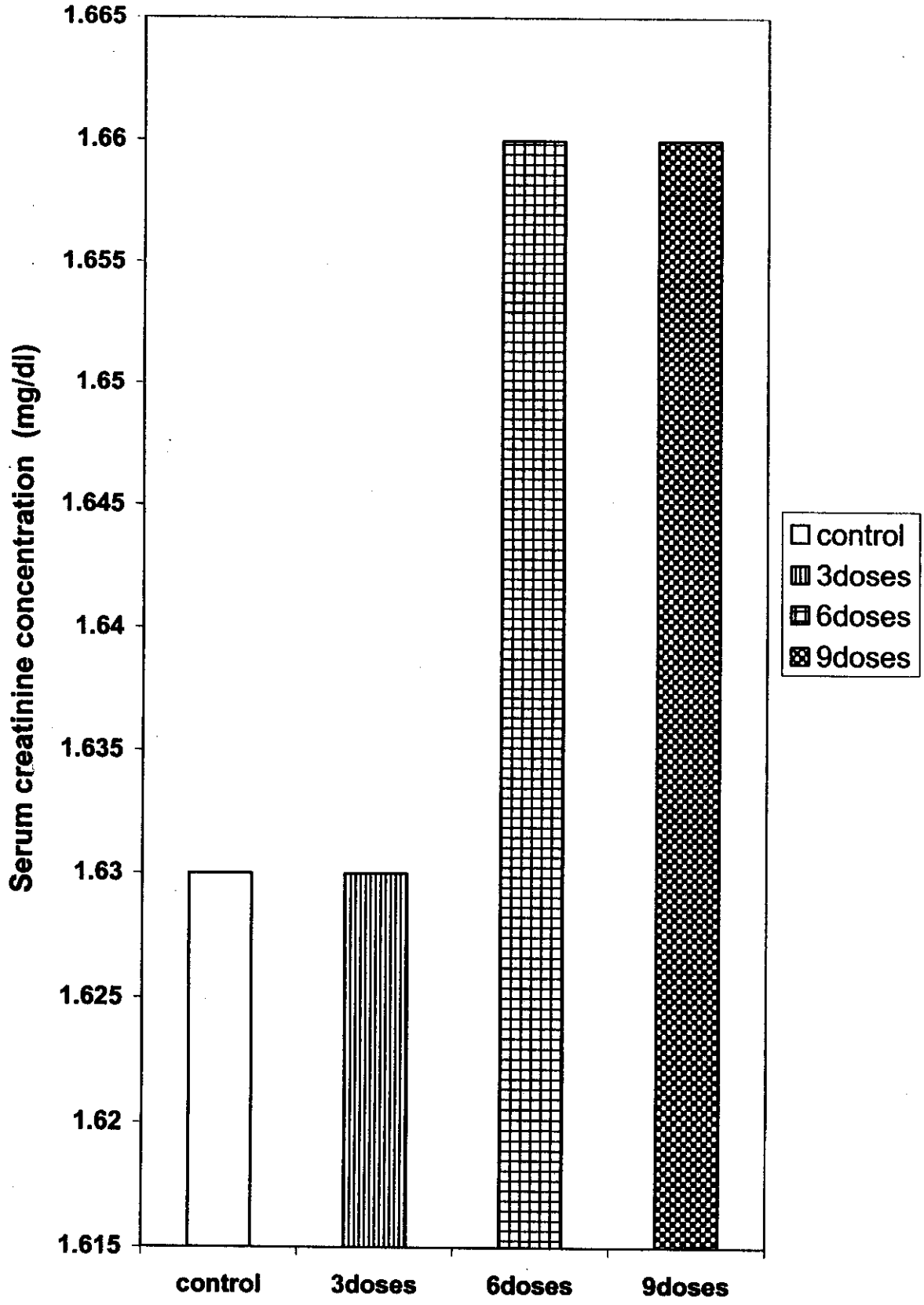

Fig. (63): Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum creatinine concentration (mg/dl) of pigeon .

Table (16) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum sodium (Na^+) , potassium (K^+) and chloride (Cl^-) ions concentration of pigeon .

Parameter Mean ± SE	*Number of oral doses*			
	Control	*3*	*6*	*9*
Na^+ (µeq. / L)	144.80 ^{abcd} ± 0.74	157.34 ^{abcd} ± 2.26	164.62 ^{abc} ± 2.21	162.66 ^{abd} ± 0.24
K^+ (µeq. / L)	2.62 ^{ac} ± 0.03	2.42 ^{bc} ± 0.17	4.90 ^{abcd} ± 0.47	3.20 ^{cd} ± 0.29
Cl^- (µeq. / L)	106.80 ^{abcd} ± 1.72	74.42 ^{ab} ± 1.42	73.28 ^{ac} ± 1.20	74.00 ^{ad} ± 0.22

Variation between similar single letters in each components is significant at $P < 0.05$ (Duncan' s test).
All data are mean of 5 individuals.

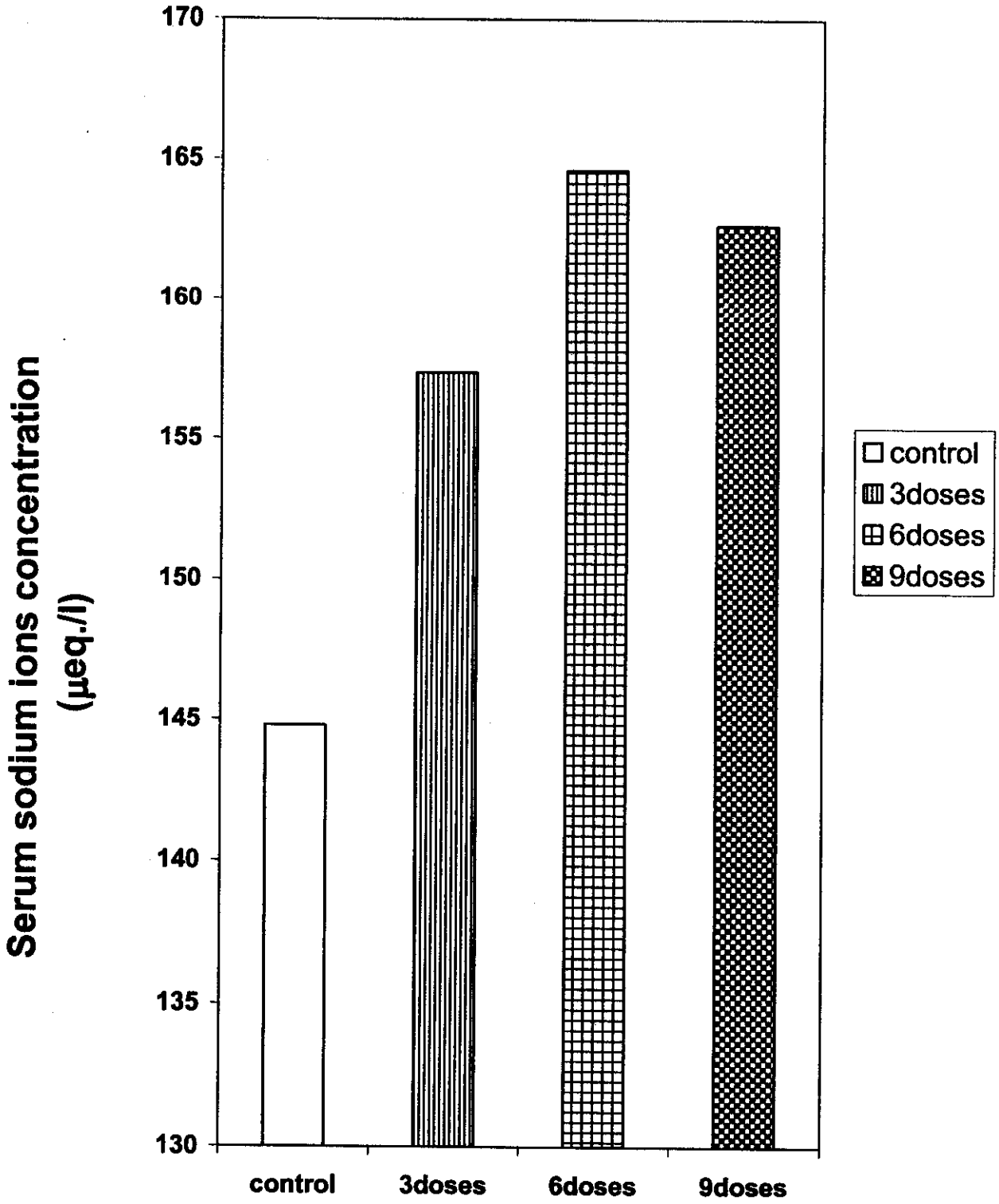

Fig. (64) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on sodium ions concentration (µeq./l) of pigeon .

recorded after 6 doses (4.90 μeq./L) of treatment. Data are presented in table (16) and figure (65).

c. Serum Chloride Ions Concentrations : -

Data of the effects of a repeated oral dose (1/10 LD_{50}) of propoxur on serum chloride ions concentration are present in table (16) and figure (66). Serum chloride ions concentration was decreased significantly after 3 doses (74.42 μeq./L), 6 doses (73.28 μeq./L) and 9 doses (74 μeq./L) as compared with that of the control group (106.8 μeq./L).

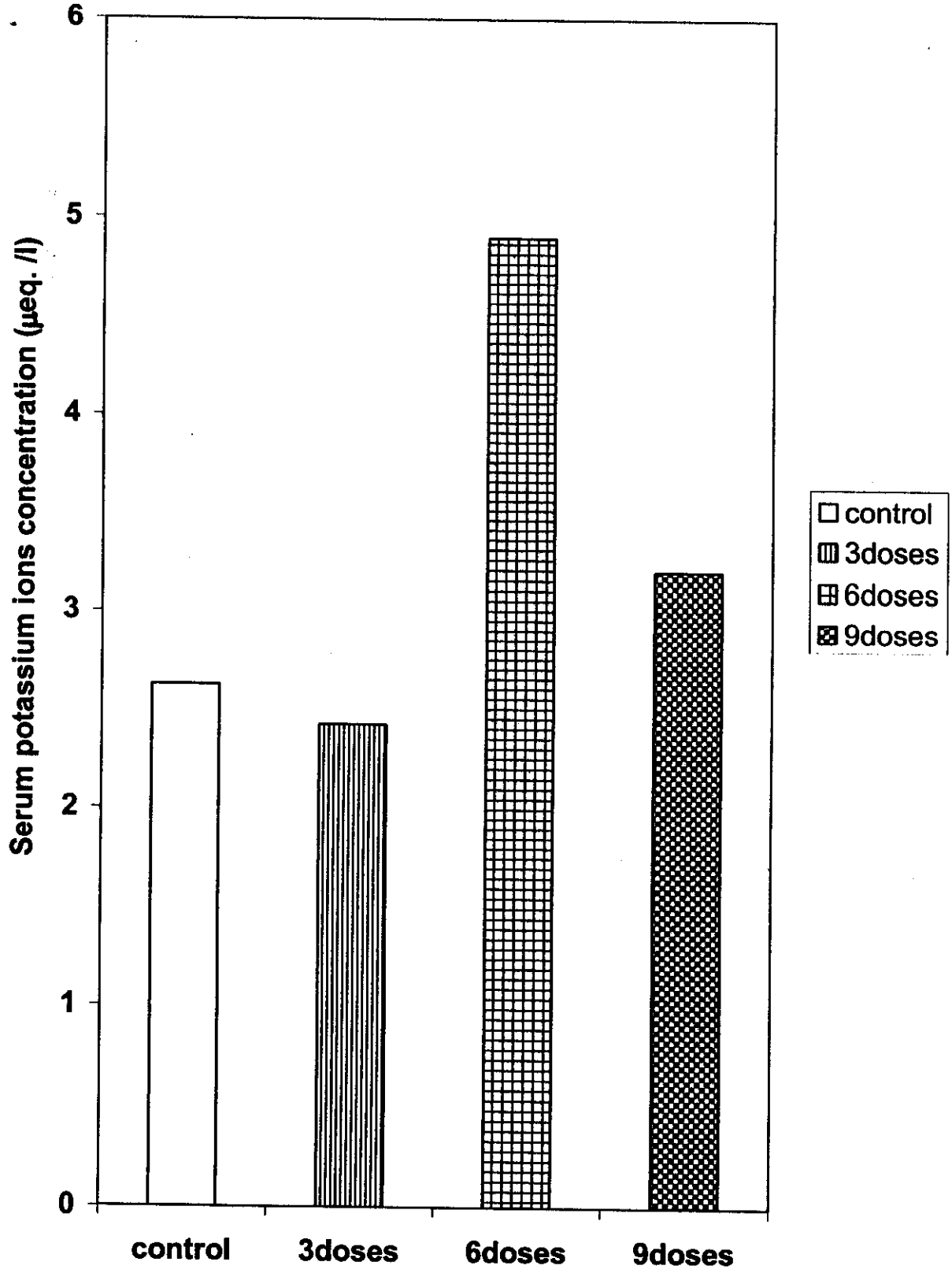

Fig. (65) : Effect of a repeated (3, 6 and 9)oral dose (1/10 LD_{50}) of propoxur on serum potassium ions concentration (µ eq. / l) of pigeon .

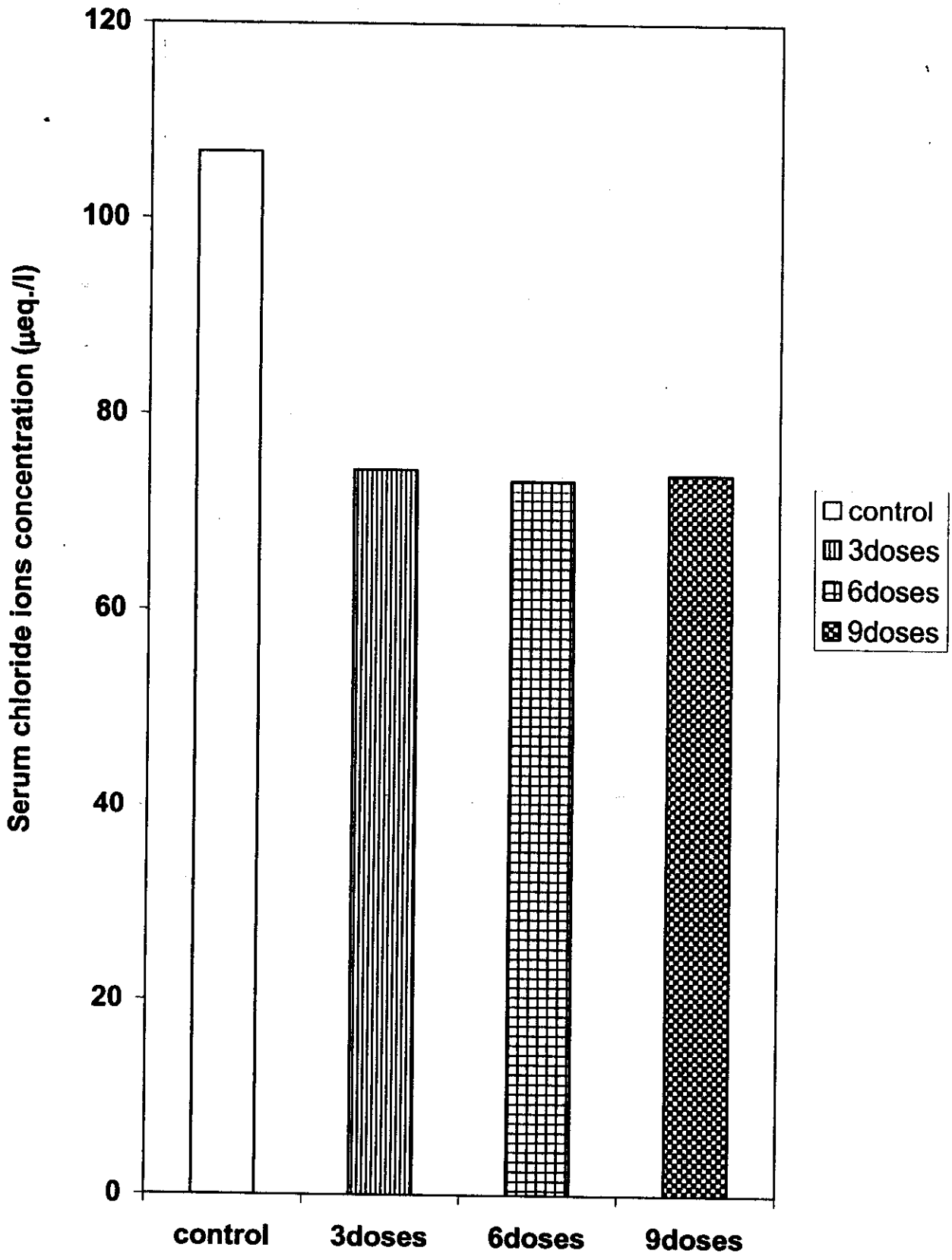

Fig. (66) : Effect of a repeated (3, 6 and 9) oral dose (1/10 LD_{50}) of propoxur on serum chloride ions concentration (µeq./l) of pigeon.