

CHAPTER IV

Liver and kidney function tests

It has been noticed in previous chapter that haemoglobine level of rat blood declines by the oral administration of lead nitrate, whiles haemoglobin contents did not altred significantly after administering 30, 60 and 90 mg nag bhasma during 21 days. However lead is known to damage the liver and kidney. Therefore in present chapter the variations in serum enzymes which indicate the status of liver function (health). Similarly serun Urea and creatinine were studied to assess the liver health.

MATERIAL AND METHODS

The experiments were carried out as described in Chapter II by giving the prescribed doses of lead nitrate and Nag bhasma. The rats were killed at the end of the experiments and serum

samples were prepared and used for the assays of AST, ALT, urea and creatinine.

RESULTS

Liver function tests

For the assessment of liver functioning aspartate amino transferase and alanine amino transferase were assayed.

Alterations in AST activities

Alterations in rats serum AST levels were given in table 1

Normal rat :

Normal rat exhibited activities were estimated 22.67 units, 23.33 units and 24.26 units AST/ per ml of serum on day 8, 15 and 22 of experimental schedule.

Lead nitrate 20 mg per kg body weight :

AST activity was increased by 1.25 folds after 7 days treatment of lead nitrate. It was further raised to 1.47 folds after 14 days treatment of Nag bhasma as compared to normal value. Further the

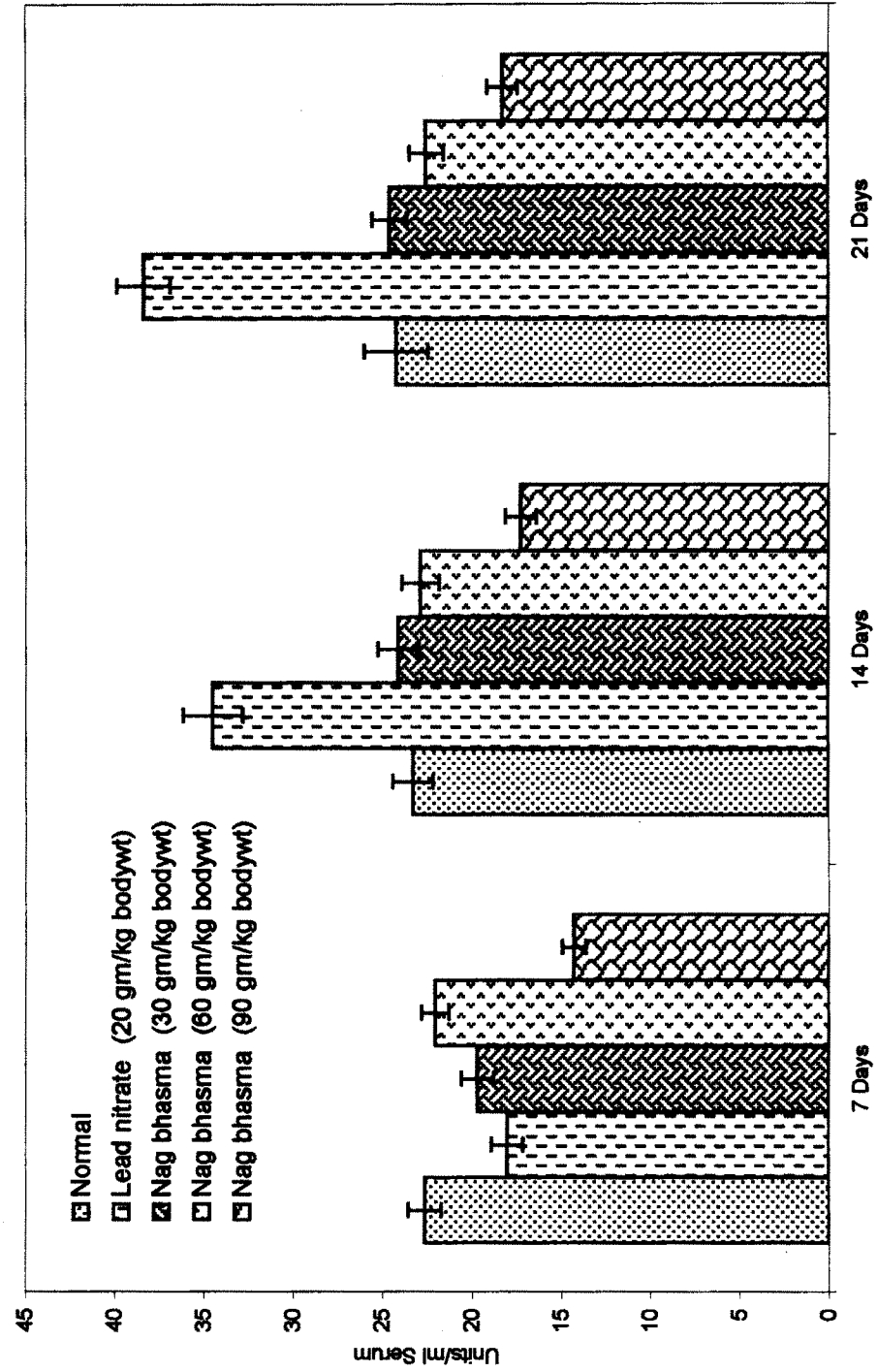
Table 1:- The variation in serum AST levels due to Nag bhasma treatment to male albino rats.

Values expressed as units/ml serum
Values are mean \pm SE of 7 animals

Group	Duration of treatment		
	7 Days	14 Days	21 Days
Normal	22.67 \pm 0.93	23.33 \pm 1.14	24.26 \pm 1.78
Lead nitrate [20 mg/kg body wt]	18.05 \pm 0.88 ^a	34.52 \pm 1.67 ^c	38.41 \pm 1.49 ^c
Nag bhasma [30 mg/kg body wt]	19.71 \pm 0.89 ^d	24.15 \pm 1.16 ^d	24.63 \pm 0.98 ^d
Nag bhasma [60 mg/kg body wt]	22.06 \pm 0.76 ^d	22.89 \pm 1.04 ^d	22.57 \pm 0.96 ^d
Nag bhasma [90 mg/kg body wt]	14.29 \pm 0.67 ^c	17.29 \pm 0.87 ^a	18.30 \pm 0.85 ^a

P values : a < 0.05; b < 0.01; d < 0.001; d > 0.05

Figure 1 -The variations in serum AST levels due to Nag bhasma treatments to male albino rats



enzyme level was enhanced by 21 days treatment of Nag bhasma. The increase of 1.48 fold was noticed as compared to the enzyme level of normal rat.

Treatment of 30 mg Nag bhasma/kg body weight of rats :

Marginal loss in AST was observed by 7 days treatment of 30 mg Nag bhasma/kg body wt, while its levels were elevated and brought nearer to normal values on 15th and 22nd days respectively.

Treatment of 60 mg Nag bhasma/kg body weight of rats :

Statistically no significant change was noted by 60 mg Nag bhasma treatments for 7, 14 and 21 days.

Treatment of 90 mg Nag bhasma/kg body weight of rats :

Administrations of 90 mg Nag bhasma/kg body wt for 7, 14 and 21 days resulted in 36.97, 25.89 and 24.57 % reductions in AST levels as compared to their respective normal values.

Alterations in ALT activities

Alterations the levels of rat serum ALT are given in table 2.

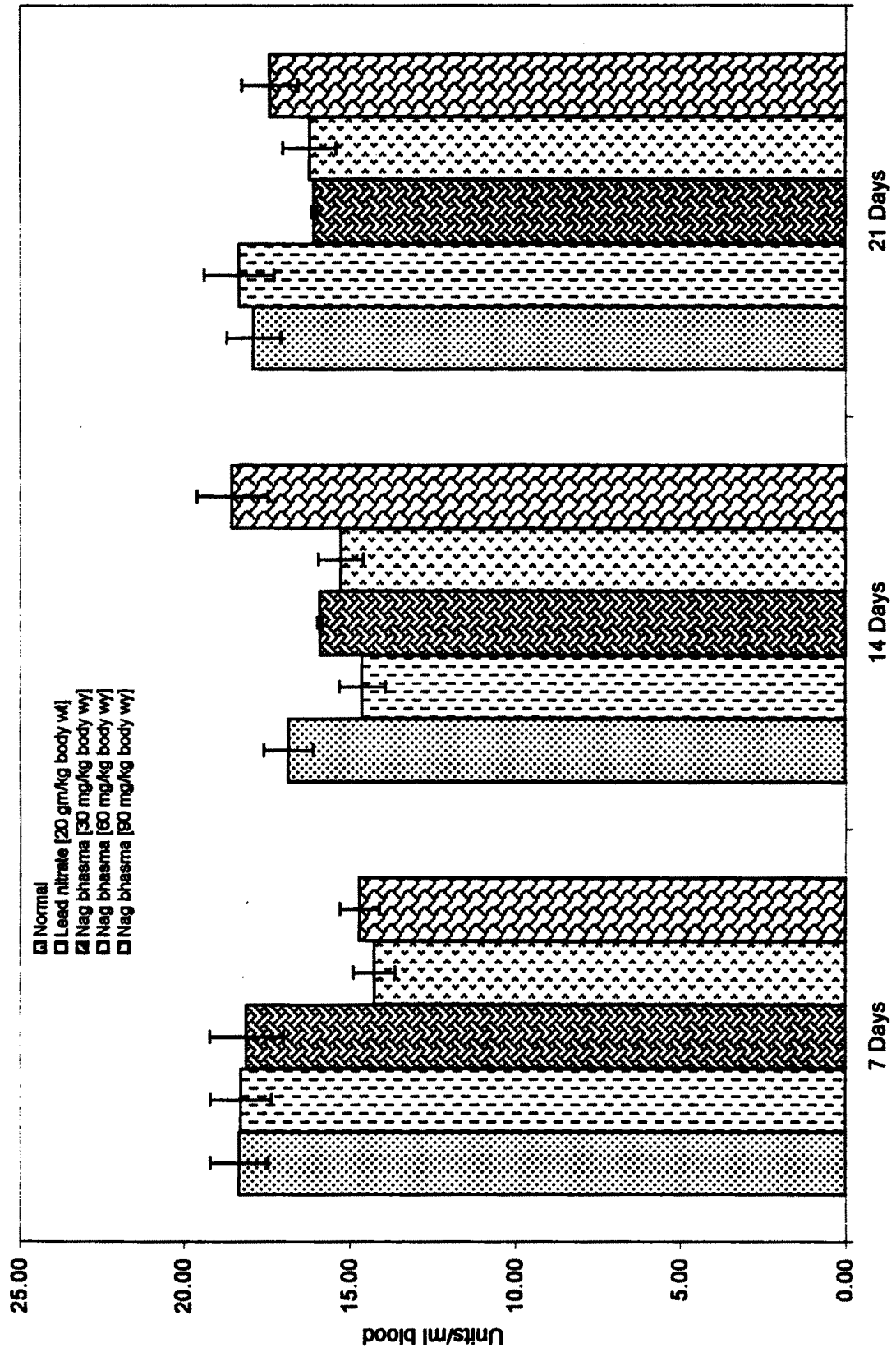
Table 2:- The influence Nag bhasma on Serum ALT levels of male albino rat serum

Values expressed as units/ml serum
Values are mean \pm SE of 7 animals

Group	Duration of treatment		
	7 Days	14 Days	21 Days
Normal	18.34 \pm 0.87	16.88 \pm 0.73	17.93 \pm 0.81
Lead nitrate [20 mg/kg body wt]	18.29 \pm 0.92 ^d	14.65 \pm 0.69 ^d	18.37 \pm 1.05 ^d
Nag bhasma [30 mg/kg body wt]	18.13 \pm 1.10 ^d	15.94 \pm 0.69 ^d	16.13 \pm 0.75 ^d
Nag bhasma [60 mg/kg body wt]	14.88 \pm 0.63 ^a	15.30 \pm 0.67 ^d	16.26 \pm 0.81 ^d
Nag bhasma [90 mg/kg body wt]	14.72 \pm 0.59 ^a	18.57 \pm 1.06 ^d	17.45 \pm 0.84 ^d

P values are as in Table 1.

Figure 2 - The effects of lead nitrate and Nag bhasma on rat serum ALT levels



Normal rat :

Normal rat exhibited 18.34, 16.88 and 17.93 units of ALT activities/ml of serum on day 8, 15 and 22 of experimental schedule.

Lead nitrate (20 mg per kg body weight) :

In lead nitrate treated rats ALT activities were not altered on day 8 of the treatment, it was decreased by 13.21 % after 14 days treatment when compared to that of respective normal value. On day 22 of experimental schedule the activity was increased by 1.25 folds.

Treatment of 30 mg Nag bhasma/kg body weight of rats :

No significant change in serum ALT was noted by 7 days treatment of Nag bhasma to rats. The activities did not alter after 14 and 21 days treatment of Nag bhasma. Statistically no significant changes in ALT were noted in AST activities.

Treatment of 60 mg Nag bhasma/kg body weight of rats :

Seven days treatment of Nag bhasma resulted in 18.87 % reduction in serum ALT as compared to normal value. During later periods of the treatments the activity was elevated marginally as compared to that noted after seven days treatment of Nag bhasma,

however the activities were not altered significantly on comparison with respective normal values after the treatments of Nag bhasma to the rats for 14 and 21 days

Treatment of 90 mg Nag bhasma/kg body weight of rats :

The treatment of Nag bhasma for 7 days resulted in decreased ALT activities by 19.74 % as compared to the activities reported in normal rats on day 8 of the treatment. ALT levels were increased as compared to that noted on 8th day after 7 days treatment of nag bhasma, while on comparison with respective normal values ALT levels did not exhibit significant alterations after treating the rats with Nag bhasma for either 14 or 21 days.

Kidney function tests :

Urea levels :

Serum urea contents of the sera of the rats of different experimental groups are presented in Table 3.

Normal rats :

Normal rat's serum showed 12.09, 12.24 and 12.29 urea mg/dl on days 8, 15 and 22 of experimental schedule.

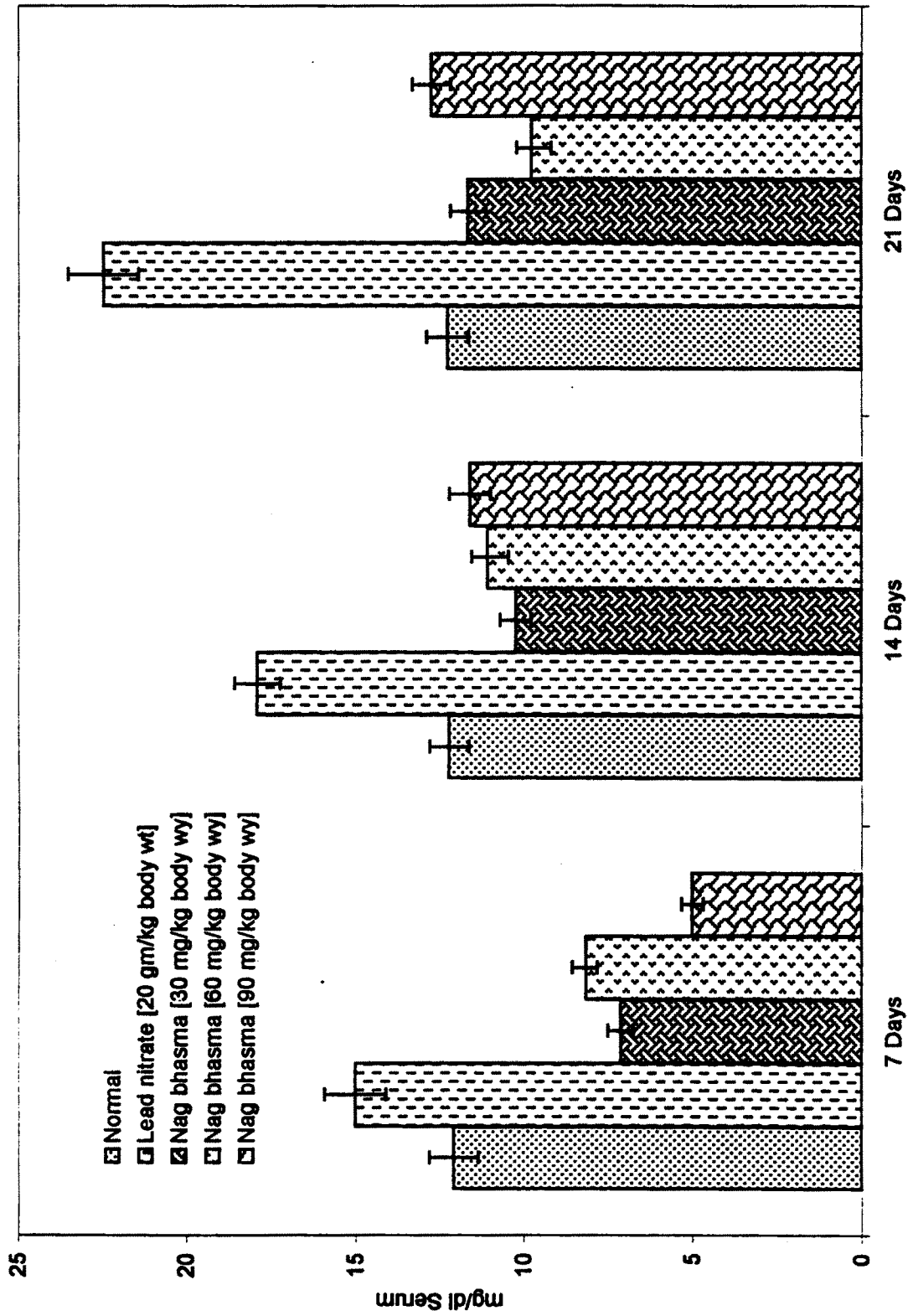
Table 3:- Nag bhasma mediated changes in serum Urea content male albino rats

Values expressed as mg/dl serum
Values are mean \pm SE of 7 animals

Group	Duration of treatment		
	7 Days	14 Days	21 Days
Normal	12.09 \pm 0.74	12.24 \pm 0.59	12.29 \pm 0.63
Lead nitrate [20 mg/kg body wt]	15.04 \pm 0.91 ^a	17.93 \pm 0.67 ^b	22.48 \pm 1.05 ^c
Nag bhasma [30 mg/kg body wt]	7.14 \pm 0.38 ^c	10.26 \pm 0.46 ^a	11.67 \pm 0.54 ^d
Nag bhasma [60 mg/kg body wt]	8.16 \pm 0.41 ^c	11.09 \pm 0.47 ^d	9.79 \pm 0.44 ^b
Nag bhasma [90 mg/kg body wt]	5.03 \pm 0.32 ^c	11.62 \pm 0.61 ^d	12.78 \pm 0.58 ^d

P values are as in Table 1.

Figure 3 - Nag bhasma mediated changes in Rat serum urea content



Lead Nitrate (20 mg /kg body weight) treated rats :

Urea content was increased progressively by the treatments of $Pb(NO_3)_2$ for 7, 14 and 21 days. The elevations of 1.24, 1.46 and 1.83 folds were noted after the administrations of Nag bhasma for 7, 14 and 21 days respectively when compared with their normal values.

30 mg/kg body weight Nag bhasma treated rats:

The treatment of 30 mg Nag bhasma/kg body wt (for 7, 14 and 21 days) showed decreases of 40.94, 16.18 and 7.73 % in urea content as compared to the urea content reported in normal rats on the corresponding days of experimental schedule.

60 mg/kg body weight Nag bhasma treated rats:

The values of urea contents were reduced by 35.51, 9.40 and 20.34 % after 7, 14 and 21 days treatments of nag bhasma to the rats as compared to the corresponding normal values.

90 mg/kg body weight Nag bhasma treated rats:

Administration of ninety mg Nag bhasma/kg body weight resulted in 58.40 and 5.07 % decline in rat serum urea content by 7 and

14 days treatment of Nag bhasma respectively, however no significant change in serum urea (1.03 fold rise) was observed after 21 days treatment of 90 mg Nag bhasma/kg body wt.

Creatinine content

Normal Rat :

Creatinine contents of normal rat serum were 2.69, 2.75 and 2.89 mg/dl on days 8, 15 and 22 during the experimental schedule described in Chapter II.

Lead Nitrate (20 mg /kg body weight) treated rats :

Statistically no significant change in creatinine content was noticed due to the administrations of lead nitrate for 7, 14 and 21 days.

30 mg/kg body weight Nag bhasma treated rats:

Significant alteration in rat serum creatinine was not observed by 7 days treatment of Nag bhasma, whereas its values were reduced by 44.36 and 49.48 % after 14 and 21 days treatments of Nag bhasma.

60 mg/kg body weight Nag bhasma treated rats:

Administration of 60 mg Nag bhasma/kg body wt for 7, 14 and 21 days caused the reductions in creatinine contents of rat serum by

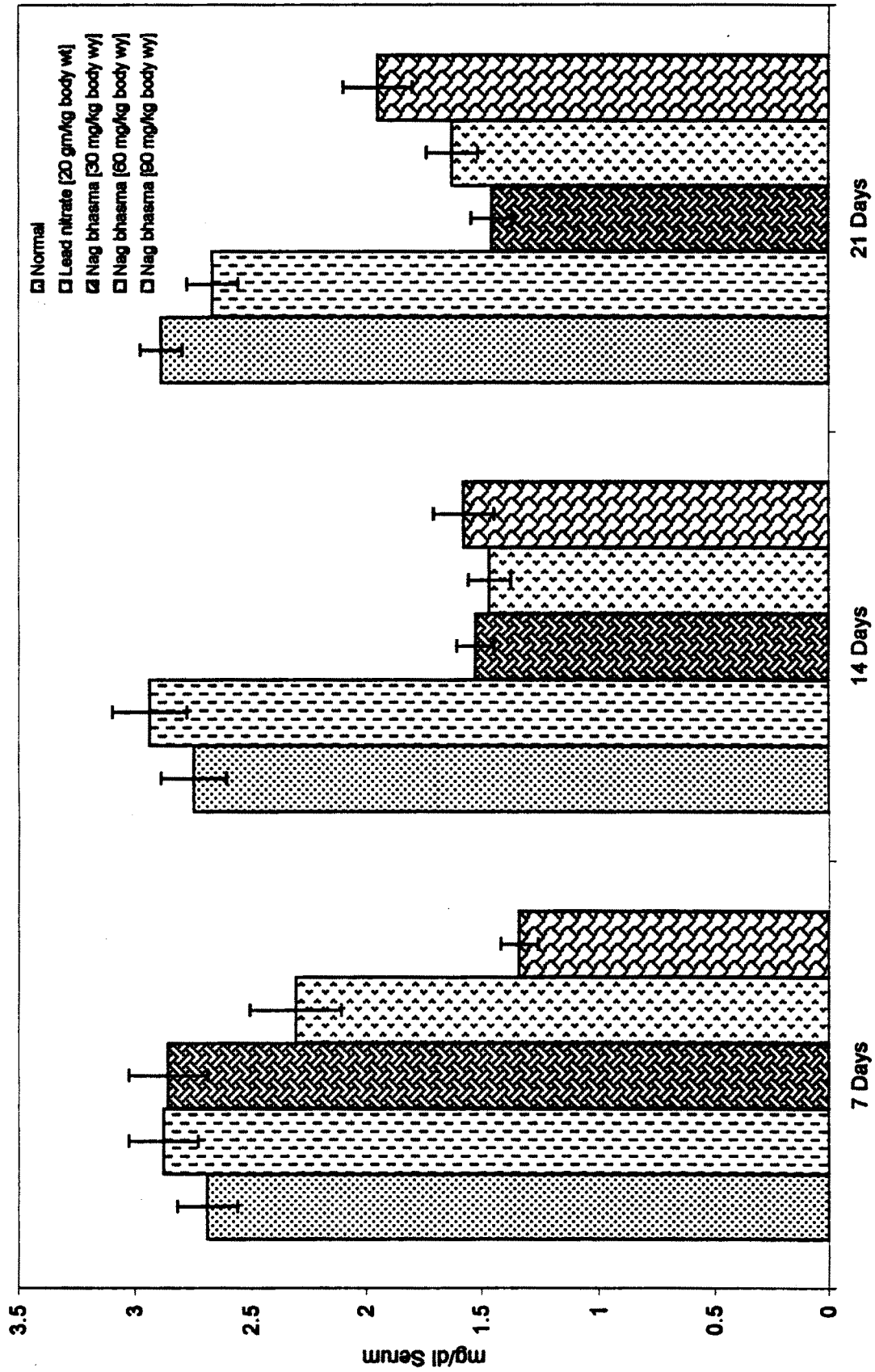
Table 4:- Serum Creatinine contents after the treatments of different doses of Nag bhasma to male albino rats.

Values expressed as mg/dl serum
 Values are mean \pm SE of 7 animals

Group	Duration of treatment		
	7 Days	14 Days	21 Days
Normal	2.69 \pm 0.13	2.75 \pm 0.14	2.89 \pm 0.09
Lead nitrate [20 mg/kg body wt]	2.88 \pm 0.15 ^d	2.94 \pm 0.16 ^d	2.67 \pm 0.11 ^d
Nag bhasma [30 mg/kg body wt]	2.86 \pm 0.17 ^d	1.53 \pm 0.08 ^c	1.46 \pm 0.09 ^c
Nag bhasma [60 mg/kg body wt]	2.31 \pm 0.20 ^a	1.47 \pm 0.09 ^c	1.63 \pm 0.11 ^c
Nag bhasma [90 mg/kg body wt]	1.34 \pm 0.08 ^c	1.58 \pm 0.13 ^c	1.95 \pm 0.15 ^c

P values are as in Table 1.

Figure 4 - Effects of lead nitrate and Nag bhasma on serum creatinine content of Albino Rat



14.13, 46.55 and 43.60 %, when compared to corresponding normal values.

90 mg/kg body weight Nag bhasma treated rats:

Creatinine contents of rat sera were declined by 50.19, 42.55 and 32.53 % after 7, 14 and 21 days treatments of 90 mg Nag bhasma/kg body wt respectively.

DISCUSSION

The clinical tests are used to test the functioning of liver and kidney are very common. Usually serum AST and ALT levels are used to assess the status of functions of liver. Therefore in present project liver functioning tests, AST and ALT were included. The treatment of lead nitrate increased these activities. But all the doses and intervals of nag bhasma had not altered AST and ALT activities significantly.

Similarly serum levels of creatinine and urea were studied to test kidney functions, since these parameters are used to evaluate the status of kidney health. Lead nitrate treatment increases the levels of both creatinine and urea indicating malfunctioning of kidney. All doses of nag bhasma and all the intervals used never exceeded the serum levels of creatinine and urea indicating no deviation in normal physiology of the kidney.

All these results indicated that nag bhasma is neither hepatotoxic nor nephrotoxic with used doses and used intervals by any possible cause.

Similar studies have been carried out to study effects of lead with similar type of alterations indicating hepatotoxicity and nephrotoxicity (Skoczynska and Smolik, 1994; Hyashi *et al*, 1993).