SUMMARY AND CONCLUSION

In a span of 2 years the progressive changes in the biochemical and vital parameters in different varieties of 50 shock cases, who were diagnosed according to the laid down criteria, were studied, periodically, till their finality appeared. Along with this, for the purpose of comparison and for estimation of excess lactate, these parameters were studied in 10 individuals who had normal haemodynamics as per prede-termined criteria.

Attempts had been made to corroborate the findings with the clinical states of the corresponding shocked patients and to find out their values in the assessment of prognosis and management.

The vital parameters recorded in this study were central venous pressure, skin and rectal temperatures, central venous and capillary haematocrit values, rate of arterial pulse beats, respiration rate, arterial blood pressure and rate of urine secretion. Their normal values were arrived at by a control study of ten haemodynamically normal patients. The values obtained were central venous pressure 7.3 ± 1.02 cm, of normal saline, skin temperature 35.8 ± 0.52 C, rectal temperature 37.6 ± 0.26 C, central venous haematocrit 40.09 ± 2.44 vel%
capillary haemocrit 40.23 ± 2.45 vpl%, rate of arterial pulse 77.4/min respiration rate 20.6% min, arterial blood pressure 118.2/81.8 mm of Hg and rate of urine secretion 0.5 ml/kg/hr(30 ml/hr).

All these values obtained in the control group of this study were compared with the findings of other workers in the field and close similarity were observed.

The biochemical parameters studied in this work, were blood levels of lactate acid, pyruvic acid, lactic/pyruvic acid ratio, excess lactate and pH, serum levels sodium, potassium and chloride and plasma bicarbonate. Control levels of these parameters were blood lactic acid 9.04 ± 5.65 mg/100 ml, pyruvic acid 0.93 ± 0.40 mg/100 ml, lactic and pyruvic acid ratio 9.72 ± 0.44, blood pH 7.41 ± 0.02, serum sodium 138.4 ± 3.20 mEq/L potassium 4.04 ± 0.46 mEq/L, Chloride 99 ± 2.36 mEq/L, and plasma bicarbonate 24.95 ± 2.72 mEq/L.

Fifty shocked cases included in this study comprised of 10 cases of cardiogenic shock, 10 cases of septic shock and thirty cases of hypovolaemic shock. The last thirty patients were further subdivided into 10 cases of haemorrhagic shock, ten cases of shock due to burns and ten cases of hypovolaemic shock due to other causes (diarrhoea, dysentery etc).
in respect of these parameters the maximum changes were noted in the cases of burns and minimum changes in the cases of cardiogenic shock. There were fall in the levels of plasma bicarbonate and blood pH. Maximum fall in the first parameter was noted in the cases of burns and minimum in haemorrhagic shock. But considering the survival groups, haemorrhagic shock cases assume the second highest position. There was very little difference noted in the extent of fall of blood pH among the different groups of shock. Out of serum electrolytes, serum sodium levels was minimum in cases of shock due to burns. Whereas, in the cases of hypovolaemic shock due to other causes, serum sodium levels showed an apparent tendency to rise. The levels of this parameter were raised in the cardiogenic shock cases. Serum potassium levels was highest in the cases of haemorrhagic shock (mean 4.38 ± 0.32 mEq/L). Whereas its level was comparatively less in the cardiogenic shock cases. But in all the cases, the difference from the control value of serum potassium was not much. Serum chloride level was highest in haemorrhagic shock. But not much of difference was noted in the serum chloride levels in other types of shock cases. There was marked difference between central venous and capillary haematocrit values indicating haemoconcentration. Similarly, the gradient between skin and rectal temperature showed marked rise in all cases of shock except those due to cardiogenic shock. Here maximum rise was noted in burns. Respiration rate were increased and tachycardia with hypotension were present in all types of shock.
It was also noted that always a significant difference was present in the levels of these vital and biochemical parameters between the survival and expired group.

In all the patients, one hour after initiation of treatment, the difference from the respective control levels of all these vital and biochemical parameters became less. Among the survival groups of patients, this observation was more markedly noticed. After three hours of treatment the values observed in all these vital and biochemical parameters approached further towards their control levels and at the time of recovery, their levels reached fairly close to the control values. In this respect, maximum response after one hour's treatment was shown by cardiogenic shock cases. Response to treatment was found to be little less in cases of haemorrhagic shock. Minimum response was observed in cases of septic shock. After three hours of continued treatment the mode of response varied accordingly to the types of shock. The cases of burns showed significant improvement while the improvement in cardiogenic shock cases was marginal. Response to treatment in the cases of septic shock was also slow but uniformly maintained.

Whereas, in the expired group at the time of initiation of treatment, the values of all the vital and biochemical parameters differed maximally from these 'control' levels. Though they decreased to some extent
after initiation of treatment for one hour, yet their rate of fall was comparatively slow, indicating less effective response to treatment.

In this group, after three hours continued treatment the differences from control levels of all the vital and biochemical parameters started increasing once again and their progressive rise reached maximum at the time of their death.

Failure of response to treatment was shown by generally increasing values of the biochemical parameters from their control levels. Study of all the parameters have been shown to be more useful than the study of any one single parameter. Besides this, this study has revealed that values of biochemical parameters which may cause death is quite different with different types of shock.

Thus, the present work revealed that the chances of survival is expected to be remote in a burn shocked case, if the biochemical parameters are as follows - Blood lactate acid 104.52 ± 12.31, blood pyruvic acid 3.88 ± 0.41, lactic/pyruvnic acid ratio 27.01 ± 0.81, excess lactate 68.04 ± 6.38 (all in mg/100 ml), plasma bicarbonate 21.61 ± 0.73, serum sodium 129.01 ± 1.95 (all in mEq/L) and blood pH 7.29 ± 0.06, as all the patients having these values died in this study. Clinically if there is intense vasoconstriction as revealed by wide
difference between central venous and capillary haematocrit values, skin and rectal temperature gradient is 11.13 °C, if the respiration rate is 35.63 ± 2.43/min and if the arterial pulse and blood pressure are unrecordable then the cases are usually fatal.

Prognosis would also be grave in a cardiogenic shock case with blood lactic acid 75.45 ± 7.98, pyruvic acid 2.99 ± 0.31, lactic acid/pyruvic acid 25.09 ± 0.50, excess lactate 46.37 ± 5.10 (all in mg/100 ml), plasma bicarbonate 22.05 ± 0.81, serum sodium 144 ± 5.42, potassium 3.81 ± 0.14, (all in mEq/L), blood pH 7.32 ± 0.03, central venous and capillary haematocrit gradient 9.75 vol%, CVP 13.60 ± 1.2 of normal saline, skin and rectal temperature gradient 3.77 °C, respiration rate 36/min, arterial pulse 131 ± 12.73/min and blood pressure 81 ± 15.64 mm of Hg.

In the case of septic shock, biochemical parameter with grave prognosis will be blood lactic acid 70.62 ± 3.87, pyruvic acid 2.58 ± 0.23, lactic/pyruvic acid ratio 27.57 ± 1.05, excess lactate 46.56 ± 1.72 (all in mg/100 ml), plasma bicarbonate 21.95 ± 0.92, serum potassium 3.98 ± 0.62, (mEq/L), & blood pH 7.29 ± 0.01. Similarly vital parameters with grave prognosis will be CVP 5.78 ± 0.06 cm of normal saline, central venous and capillary haematocrit gradient more than 9 vol%, skin and rectal temperature
gradient 11.78 oC, respiration rate 44 ± 1.73/min pulse rate 143.33 ± 5.77/min and blood pressure 70.33 ± 9.56/54.67 ± 5.03 mm of Hg.

In the case of hypovolaemic shock due to other causes chance of survival will be poor with blood lactic acid level 90.94 ± 10.16, pyruvic acid 3.58 ± 0.35, lactic/pyruvic acid ratio 25.29 ± 0.55, excess lactate 56.15 ± 6.22 (all in mg/100 ml), plasma bicarbonate 21.95 ± 0.85, serum potassium 3.73 ± 0.06, chloride 94.67 ± 3.06 (all in mEq/L), blood pH 7.23 ± 0.07, profound tissue ischaemia (as revealed by wide central venous and capillary haematocrit values), skin and rectal temperature gradient 10.47 oC, respiration rate 34 ± 7/min, arterial pulse 130/min and blood pressure 88/64 mm of Hg.

Whereas with prompt and adequate treatment, good chances of survival could be expected in haemorrhagic shock even with blood lactic acid 73.53 ± 6.03, pyruvic acid 3.00 ± 0.32, lactic/pyruvic acid ratio 24.91 ± 1.67, excess lactate 43.42 ± 3.59 (all in mg/100 ml), plasma bicarbonate 21.13 ± 0.85, serum sodium 133.50 ± 3.17 (all in mEq/L), moderate tissue ischaemia (revealed by inability to collect capillary blood even after repeated attempts), skin & rectal temperature gradient 11.53 oC, respiration rate 41.45/min and unrecordable arterial blood pressure and pulse.

The study of excess lactate in these 50 shocked cases deserved special mention. Rise of excess lactate which was related with the severity and duration of shock was maximum
in 4 cases of burns. They had 70% or more burn of their body surfaces and all expired. Survival rates of patients having excess lactate 50-79 mg/100 ml, came down to 40%. Similarly, the relation between the levels of blood lactic acid and survival rate of the patients were also studied. It showed that with 95-120 mg/100 ml blood lactic acid, the survival rate reduced to 50%.

These data could also help in their management in a better way than that would have possible without them. In this respect, estimation of blood lactic acid, pyruvic acid, lactic/pyruvic acid ratio, excess lactate, blood pH and plasma bicarbonate play important role.

Estimation of serum electrolytes, central venous and capillary hematocrit values and central venous pressure also have some place in the assessment of prognosis of the case. But their role is more important in the management of the case.

Thus from the study it appeared that a tritratred treatment (i.e. if the treatment was carried out according to the data obtained by estimation of the above biochemical and vital parameters) during different phases of their management, were more rational and better effective.