SUMMARY
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Tissue enzymes are released in the plasma after cell damage or cell death in a specific organ or tissue. So the elevated level of serum enzymes which are specific for a particular tissue will undoubtedly have a great diagnostic value. The states of health and disease of a specific tissue is also reflected by any changes of the enzymes in the tissue itself. But it is rarely possible to estimate the enzymes in human tissues. However as various metabolic patterns of mammalian species do not differ much from that of human tissues at least qualitatively the data on enzyme levels gathered on tissues of other mammals can be compared to that of human. Furthermore it is an established scientific fact that when consistent results of an experiment are observed in three different mammalian species, the results can safely be extrapolated to human beings. Therefore we have studied the tissue distribution of AST, ALT, ALP, ACP and amylase in buffalo, goat and rabbit. Since the normal levels of serum enzymes are influenced much by the nutritional status, age, sex and ethnic groups (20a), their determination is essential in a country like ours where these values vary substantially from one population group to another. Accordingly we have determined the serum level of the above mentioned enzymes in human.
These enzymes were measured in two hundred blood samples collected from clinically healthy individuals of Aligarh population of different age and sex.

The outcome of this endeavour is described below.

Interestingly there was almost no species dependent differences in the level of AST in serum, skeletal muscle, lung, brain, liver and heart though tissue dependent variations were found. The activity in kidney tissue was nearly the same in goat and buffalo but significantly low in rabbit. The discrepancy can not be attributed to experimental error only. It's significance is not clear to us. The level of AST was found to be highest in brain and low in lung and liver. The activities in heart and skeletal muscle were in between. These findings regarding tissue distribution are in good agreement with the findings (Table 6) of other clinical enzymologists on human tissues except that, the activity found in liver in the present study was much lower than that reported by others (96,103,104). As the method of preparation of enzyme sample was different in all the reported studies such comparison is hardly applicable here.

Species dependent differences in the level of ALT for various tissues range from 4-50%. Maximum difference was noted in lung followed by liver. The enzyme levels were invariant
in the kidney tissue irrespective of species. The serum level of ALT was almost similar in buffalo, goat and human but significantly higher in rabbit. For the same species, the level of ALT was found to be markedly higher in skeletal muscle, heart and brain and substantially lower in liver, lung and serum. Despite experimental inaccuracy these results suggest that ALT level is higher in skeletal muscle, heart and brain.

In heart and serum the ALP levels were almost same regardless of species. Species dependent variation was maximum (52%) in kidney tissue followed by liver, lung, skeletal muscle and brain (25-29%). Except serum the level of enzyme in other tissues was found to be highest in goat followed by buffalo and rabbit. Among the tissues studied here, maximum level was found in kidney. The concentrations in heart, brain and skeletal muscle were significantly low.

The levels of ACP were the same in heart and skeletal muscle for all the three species. Species dependent variation was noted maximum in kidney and intermediate for the other tissues (22-38%). The serum level of the enzyme was found to be very low in all the four species in comparison to other body tissues. Tissuewise highest concentration of the enzyme was noted in brain regardless of species followed by kidney and lung.
The serum amylase levels were found to be similar in all the four mammalian systems. The enzyme levels were substantially higher in liver and kidney irrespective of species. The lowest activity was measured in the skeletal muscle.

The amylase activities of lung, brain, heart and serum were almost similar.

After studying the tissue distribution of these enzymes in different mammalian systems, we measured the normal serum levels of these enzymes in two hundred clinically healthy individuals of Aligarh population.

Statistical analysis of the results shows that the normal serum levels found in this study correlate well with those reported in literature (105-107) except in case of amylase which was found to be significantly on higher normal range in Aligarh population.

Statistically significant sex dependent differences in the enzyme levels were found in case of AST \((p<0.05)\) and ACP \((p<0.05)\) with higher values in male.

The sex dependent differences in the activities of the rest of the enzymes seem to be statistically insignificant \((p>0.05)\). Generally males tend to show somewhat higher level of alkaline phosphatase than women do. This may be related to differences in skeletal mass, but it is also related to
greater physical activity of the male which serves as a stimulus for an increase in bone formation (108,109). Healthy males also exhibit slightly higher transaminase levels than females (33).

Statistically significant higher values of ACP (p < 0.001) were found in children (0-12 years) in comparison to adult (12-70 years). Age dependent variations in enzyme levels was insignificant for other enzymes (p > 0.05). The level of both acid and alkaline phosphatases is higher in growing children than in adult. This is due to the increased bone growth at this age (109, 110-112). Transaminase level is also higher in children age group (111).

Males in second and sixth decades were found to have statistically significant higher values (p < 0.05) of serum AST than that of the females of the same age groups.

Statistically significant higher values of serum ALP (p < 0.05) were found in the males of second decade age group.

No statistically significant differences (p > 0.05) were found in serum ALT&amylase levels between males and females of different age groups.
Statistically significant higher values of serum AGP was found in males of second and fifth decade age groups than that of the females of corresponding age groups.