

## STABILITY OF SERUM LITHIUM LEVELS—USEFULNESS AND RELEVANCE IN INDIAN CONDITIONS

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### SUMMARY

Two groups of patients on regular lithium therapy were studied to find out the stability in values of serum lithium over a period of time. Serum samples of one group was stored at  $-4^{\circ}\text{C}$  while that of other group at room temperature. These samples were subsequently analysed over a period of eight days and subjected to statistical analysis. It was seen that values on the first day did not differ significantly from values of subsequent days. Implications of this findings are discussed in Indian conditions as lithium estimation facilities are available only at a few centres.

The usefulness of lithium in the treatment of acute mania and prophylaxis of recurrent manic depressive psychosis has now been well established as reported in various studies (Prien *et al.*, 1972, Coppen *et al.*, 1971, Baastrup *et al.*, 1970). The use of lithium has been steadily increasing during the past decade in this country. Many reports have appeared from several centres in India using lithium regularly (Ghosh *et al.*, 1977, Venkoba Rao and Hariharasubramaniam, 1978, Narayanan *et al.*, 1979). Though the number of psychiatric centres have increased significantly, yet the use of lithium is limited only to a few centres even when lithium is now an accepted and important therapeutic and prophylactic agent in psychiatry. Main reason for its limited use seems to be the lack of facility for serum lithium estimation.

Lithium has a rather narrow safety margin. Its therapeutic range lies between 0.6-1.2 mEq/litre. Beyond 1.5 mEq/litre toxic symptoms start appearing and levels above 2.0 mEq/litre may prove to be

irreversibly toxic. Since lithium is used on long-term basis in a patient, it is essential that the levels are kept between safe levels with the help of regular blood monitoring. Subhash *et al.* (1980) stress the need for regular monitoring in patients receiving lithium. Moreover, reports are now appearing that when lithium is used continuously over a number of years in a patient, thyroid and renal functions may be impaired even if serum-levels are kept within therapeutic range. In spite of this lithium remains an effective modality of treatment. But centres with no facility for its estimation are at a disadvantage. Kuruvilla *et al.* (1977) suggested that since serum lithium levels remain stable over a period of time, one could send serum by post for analysis to a centre offering facility for lithium estimation. This was in contrast to earlier understanding that serum estimations must be made within six hours of collection of sample, otherwise it leads to deterioration in values (Brown and Legg, 1970). Kuruvilla *et al.* (1977) have pre-

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sented only the initial results in support of their suggestion. The present study was carried out to examine this issue.

#### MATERIAL AND METHOD

Patients attached to Lithium Clinic of the Department of Psychiatry, PGIMER, Chandigarh formed the sample of this study. These patients attend the clinic regularly and their serum-lithium estimations are done periodically. Detailed data and the outcome of treatment have been reported earlier (Srinivasa Murthy, 1981). Blood samples were collected from the patients at 9.00 a.m. in the morning on empty stomach, after 12 hours of last lithium dose. Serum was separated within two hours of blood collection.

For this study, 30 patients were selected randomly and divided into two groups. Group I consisted of patients whose serum samples were stored at  $4^{\circ}\text{C}$  for subsequent analysis while sera of patients of group II were stored at room temperature in tightly

covered vials. Serum lithium levels were determined by flame-photometry by method of Brown & Legg (1970). Estimations were done on day 1, 3, 5, 7 and 8 to determine whether storing of sera over a period of time changed the values. Two groups were evolved to specifically observe the values of sera stored at room temperature so as to determine the relevance of sending serum by post for analysis. All the data were subjected to statistical analysis.

#### RESULTS

Two sera samples in group I and four in group II were insufficient in quantity and did not last for five estimations. Thus for final analysis the groups had 13 and 11 subjects respectively. In each group, the values of all patients on a particular day were added to calculate mean value on that particular day. Thus for each group, five basal mean values were obtained (see Table I and II) and significance of difference was determined by different method.

TABLE I

#### Group A

Serial number	Mean $\pm$ S. D.	Difference of Mean	t	Significance
I	0.82 $\pm$ (0.374)	.. I-II=0.01	.. 0.027	N.S.
II	0.813 $\pm$ (0.406)	.. I-III=0.047	.. 0.132	N.S.
III	0.776 $\pm$ (0.333)	.. I-IV=0.041	.. 0.115	N.S.
IV	0.782 $\pm$ (0.325)	.. I-V=0.046	.. 0.129	N.S.
V	0.777 $\pm$ (0.344)	.. ..	..	..

TABLE II

#### Group B

No.	Mean $\pm$ S. D.	Difference of Mean	t	Significance
I	0.90 $\pm$ (0.41)	.. I-II=0.02	.. 0.045	N.S.
II	0.88 $\pm$ (0.42)	.. I-III=0.08	.. 0.190	N.S.
III	0.82 $\pm$ (0.38)	.. I-IV=0.1	.. 0.179	N.S.
IV	0.80 $\pm$ (0.36)	.. I-V=0.06	.. 0.141	N.S.
V	0.84 $\pm$ (0.36)	.. ..	..	..

For both the Tables : S. D's are given in parentheses.

't' values are computed by using difference method.

N.S.—Not significant.

From the tables it is clear that the basal mean value on first day in each group did not differ significantly from basal mean values of subsequent days. It shows that the serum samples containing lithium are stable for at least eight days after the collection.

#### IMPLICATIONS

Our study has some very important implications for practical therapeutic use of lithium. The fact that the values remain stable for a fairly long time can be useful in a number of situations. Most importantly, psychiatrists and psychiatric centres having no facilities for serum lithium estimations could send patients' sera (by post or otherwise) to a centre having such a facility. It would result in a larger number of patients benefiting from this therapy.

#### ACKNOWLEDGEMENTS

Authors wish to express their sincere thanks to Dr. Dwarka Pershad, Lecturer, Clinical Psychology at the Department of Psychiatry, PGIMER, Chandigarh for his help in statistical analysis.

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