British Journal of Psychiatry (1988), **152**, 853–854

Severe Memory Impairment with Acute Overdose Lithium Toxicity
A Case Report

This report describes a young patient with acute overdose lithium toxicity, who developed severe memory impairment in spite of treatment with haemodialysis. His memory showed gradual recovery, but definite impairment could still be detected 2 months after the overdose.

Lithium is well known to be neurotoxic, and there are a number of reports in the literature on long-lasting or irreversible neurological manifestations of lithium toxicity (e.g. Donaldson & Cunningham, 1983; Schou, 1984). However, we are not aware of any report of severe or long-lasting memory impairment due to lithium toxicity except a passing reference by Schou (1984). We report here a case of a young patient with manic depressive psychosis, who developed severe memory impairment after he took an overdose of lithium with suicidal intent.

Case report

Mr R, a 21-year-old paramedical student, was prescribed lithium carbonate in February 1987, after he had suffered from two episodes of mania in the previous 18 months, both preceded by short depressive phases. He was taking lithium carbonate (900 mg per day in divided doses), and his serum lithium level 12 h after the last dose was 1.0 mE/litre. He was not taking any other drugs during this period. Within 5 weeks of starting lithium, he was brought to emergency services one morning after having ingested 50 tablets of lithium carbonate (300 mg each) with suicidal intent. He had spontaneously vomited twice before being brought, and an emergency gastric lavage was performed. He was conscious and alert, and his physical examination did not reveal any abnormality except tachycardia. His first serum sample, taken 4 h after the overdose, showed a lithium level of 2.7 mE/litre. The patient in the meantime had become drowsy and irritable, and had developed dysarthria and tremors of his extremities. However, when aroused, he still appeared oriented to place and persons. An urgent request was sent to the nephrology department and haemodialysis was started 8 h after the drug intake. His serum lithium level at the end of 4 h of haemodialysis was 0.75 mE/litre. Except for a slight rise to 0.9 mE/litre after 4 h, the level gradually decreased to reach zero, 36 h after the termination of dialysis.

His drowsiness and irritability improved rapidly after dialysis, but dysarthria and tremors remained.

On the third day, his attention could be easily aroused, but his concentration was not sustained. He showed perseveration of speech. He was oriented to place and persons, and knew the approximate time of day, but not day or date. His memory showed severe impairment for remote as well as recent events. He could not recall anything about a meal he had eaten half an hour earlier, and made a mistake about the year when he left school. On testing his memory with the PGI Memory Scale, he scored only 7 points, the mean for educated young persons being 85 ± 6.3. The PGI Memory Scale incorporates 10 subtests for a comprehensive assessment of memory functions, and has shown satisfactory reliability and validity indices for the Indian population (Pershad & Wig, 1978).

A neurological examination showed him to have mild dysarthria and tremors with brisk, but bilaterally symmetrical, deep tendon reflexes. His EEG showed a predominance of beta activity without any lateralisation or localisation signs. A computerised tomography scan of his head did not reveal any abnormality. His renal-function tests were within normal limits and an ECG showed only tachycardia.

In the subsequent 2 months, he showed gradual but slow improvement in his concentration ability and memory. However, he still showed definite memory impairment, mainly for recent events. His score on the above-mentioned memory scale had increased to 58.

Discussion

This patient showed severe memory impairment with acute overdose lithium toxicity, in spite of prompt treatment with haemodialysis. This impairment persisted for more than 2 months, and hence can be called 'long-lasting' according to the arbitrary definition used by Schou (1984). A part of this impairment may possibly be irreversible.

As early as 1968, Schou noted "a feeling of lowered ability to concentrate and memorise" with lithium. He also reported "slight memory impairment", which persisted for a few weeks in one patient with overdose. After that, a number of studies have reported on the effect of lithium on cognitive functions, especially memory. These include studies on animals (Benowitz & Sperry, 1973) demonstrating that lithium interferes with specific steps in certain memory and learning tasks. Studies on normal human subjects have also suggested that lithium may impair free recall (Kropf & Muller-Oerlinghausen, 1979). Studies on affective-disorder patients receiving lithium in non-toxic doses have also suggested that subjective complaints of memory impairment are quite common (Ghose, 1977; Abou-Saleh & Coppen,

https://doi.org/10.1192/bjp.152.6.853 Published online by Cambridge University Press

1983). Some studies have used objective tests and adequate controls to suggest that patients on lithium have significant memory impairment (Kusumo & Vaughan, 1977; Christodoulou *et al*, 1981). However, other studies have not found any significant memory impairment with lithium treatment (Telford & Worral, 1978; Ananth *et al*, 1981). It is apparent that this area remains controversial. The reported case provides evidence in favour of memory impairment being a specific adverse effect of lithium overdose.

Acknowledgement

The authors are grateful to Dr J. K. Grover for help with lithium estimations and Professor K. K. Malhotra for haemodialysis.

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*Shekhar Saxena, BSc, MBBS, MD, *Assistant Professor*; P. Mallikarjuna, MBBS, *Junior Resident, Department of Psychiatry, All-India Institute of Medical Sciences, New Delhi, 110029, India*

*Correspondence

https://doi.org/10.1192/bjp.152.6.853 Published online by Cambridge University Press