Original Research

A Survey of Patients' Knowledge About Lithium Therapy in the Elderly

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ABSTRACT

Objective: Lithium is commonly used in the treatment of various psychiatric disorders. It has a narrow therapeutic range and a mortality rate of 9% in patients intoxicated during maintenance therapy. Therefore, for lithium to be prescribed safely, clinicians must ensure that patients are aware of features of lithium toxicity. We aim to identify patients' knowledge of lithium in the elderly population and associated factors that may influence this knowledge.

Method: The Lithium Knowledge Test (LKT) is a brief questionnaire that was developed as a means of identifying patients' practical and pharmacologic knowledge, which is important if therapy is to be safe and effective. The survey was conducted in the outpatient service of the Department of Old Age Psychiatry attached to a university teaching hospital in an urban area in Ireland between January 2011 and July 2011. A total of 33 patients participated in the survey, and the LKT questionnaires were completed by all participants. The LKT scores are obtained by adding up the responses to the questions, while the LKT hazard scores are obtained by adding together the responses to the questions on symptoms of toxicity. The result was analyzed using SPSS version 20 (SPSS Inc, Chicago, Illinois), and the relationships between LKT scores and LKT hazard scores as well as other variables were examined using Pearson's correlation coefficient.

Results: The mean LKT score of our sample population was 4.45, suggestive of poor knowledge of lithium, and the mean LKT hazard score was 5.85, highly suggestive of potentially hazardous lack of knowledge. There was a significant negative correlation between the LKT score and hazard score (r=-0.65, P<.01 [1-tailed]).

Conclusions: The survey results highlight the need for patients to be given comprehensive information about lithium prior to commencement of treatment and a refresher educational program during lithium therapy.

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Submitted: June 24, 2013; accepted November 13, 2013. Published online: March 6, 2014. Corresponding author: Walter Enudi, MBChB, MRCPsych, Department of Old Age Psychiatry, St James's Hospital, Dublin, Ireland (wenudi@yahoo.com). Lithium in the treatment of psychiatric disorders is as effective in the elderly as in the general adult population according to Wilkinson et al.¹ Lithium has been used in the treatment of various psychiatric disorders such as bipolar disorder, recurrent depression, and treatment-resistant depression and has been shown to be effective. Lithium has a narrow therapeutic range, and a study by Hansen and Amdisen² reported the mortality rate of lithium toxicity to be about 25% in an acute overdose. The mortality rate is about 9% in patients intoxicated during maintenance therapy, with 10% of them suffering permanent neurologic damage.²

Hewick et al³ state that lithium neurotoxicity clearly occurs in the elderly at concentrations considered to be "therapeutic" in the general adult populations. One reason for the increased lithium intoxication risk is that total body water decreases with advancing age, resulting in a lower volume of water per kilogram of body weight. Therefore, the same dose of lithium in an older person would have less water for the lithium to distribute into, resulting in higher lithium concentration. A second factor is that lithium is excreted by the kidney, and the glomerular filtration rate decreases with age, further increasing the risk of lithium toxicity in the elderly. Other factors that might increase the risk of lithium intoxication in a patient on long-term lithium therapy include drug interactions, as shown in the review by Hines and Murphy,⁴ as well as concurrent illness resulting in electrolyte derangement and decreased circulating volume. This is of clinical importance in the elderly due to significant pharmacokinetic drug interactions involving lithium and other drugs such as thiazide diuretics, angiotensin-converting enzyme inhibitors, and nonsteroidal anti-inflammatory drugs, which are commonly used in the elderly.

Generally, patients who are stable mentally and on lithium maintenance therapy have less frequent clinic appointments. Such patients are routinely seen in our clinic once every 3 months. Therefore, for lithium to be prescribed safely, clinicians must ensure that these patients are well aware of features of lithium toxicity. Such awareness is of particular importance in the elderly population, because they may have difficulties understanding and remembering essential information.

Dharmendra and Eagles⁵ studied factors associated with patients' knowledge of and attitudes toward lithium therapy and revealed that adequate knowledge about lithium was associated with shorter duration of treatment, younger age, and positive attitudes toward lithium.

The main objective of our survey was to identify patients' practical and pharmacologic knowledge about lithium therapy required for its safe and effective use. We also sought to determine if there are other factors that influence this knowledge. This survey, unlike other studies, aimed to look at patients' knowledge of lithium therapy in the older age group.

METHOD

The survey was conducted in the outpatient service of the Department of Old Age Psychiatry attached to a university teaching hospital in an urban area in Dublin, Ireland between January 2011 and July 2011. The clinic provides ongoing care for the elderly above the age of 65 years. Participants

- Poor knowledge of lithium therapy contributes to lithium toxicity in patients.
- Clinicians need to consider stopping lithium in elderly patients who evidence early signs of cognitive impairment unless their medications are being supervised.
- Patients on lithium therapy should be given ongoing education about lithium tailored to their comprehension levels.

were informed about the rationale and procedure for the study (completing the questionnaires).

Participants were given the questionnaire to fill out before their scheduled appointments, and, in certain cases, were assisted in completing the questionnaires. Participation was voluntary, and answers were kept confidential with participants' identity anonymous, which was reassuring for the participants. The project satisfied the requirements of the Research Ethics Committee of the hospital and was approved.

Sample

Patients in remission attending the outpatient return clinic and established on lithium therapy were invited to participate in the study. Patients who were mentally unstable at the time of completing the questionnaire and with signs of memory difficulty with scores < 25 or with a score of zero on the recall item of the 30-item Mini-Mental State Examination (MMSE)⁶ were excluded from the study.

A total of 41 patients on lithium therapy attended the clinic over the period of the survey, and 33 of them completed the questionnaires, while 4 patients declined. Among those who declined, 3 gave no specific reasons, while 1 said that she knew little about her medication and therefore was not interested. The remaining 4 patients were excluded, as they did not fulfill the inclusion criteria; 3 of them were unstable mentally and 1 showed signs of cognitive impairment with an MMSE score < 25.

Data and Instrument

Information collected from the participants included their age, gender, duration of lithium treatment, and educational status. Their diagnoses were also verified by chart review. Venous blood was collected from the participants for plasma lithium concentration. The instrument used was the Lithium Knowledge Test (LKT) questionnaire. The LKT was developed by Peet and Harvey⁷ as a means of identifying patients' practical and pharmacologic knowledge, which is important if therapy is to be safe and effective. The domains of knowledge cover areas including mode of action of lithium, lithium interactions, common side effects, risks and signs of intoxication, necessity of lithium levels, actions to be taken if lithium toxicity is suspected, and general treatmentrelated issues of lithium therapy. The LKT comprises 20 questions, with 1 point to be added for every correct answer and 1 point to be deducted for every wrong one. The total

LKT score is obtained by adding up the responses to the 20 questions.

The LKT was validated by Peet and Harvey⁷ in a younger population with a mean age of 52 years. The sample consisted of patients who were consecutive attendees at a lithium clinic with an average duration of treatment and illness of 7 and 18 years, respectively. There was no mention of the education level of the sample in the Peet and Harvey study.⁷ The LKT has not been validated using actual adverse events to lithium toxicity as the gold standard.

The mean LKT score of patients in the Peet and Harvey study was close to $6.^7$ They conclude that a mean LKT score >6 indicates adequate knowledge of lithium.⁷ The instrument also provides a hazard score, which is obtained by adding together the responses to the 9 questions on symptoms of toxicity and precautionary measures to prevent lithium toxicity. The mean LKT hazard score in the Peet and Harvey study⁷ was close to 4, and a mean hazard score >4 indicated increased hazard.

Data analysis was performed using SPSS version 20 (SPSS Inc, Chicago, Illinois). The relationships between LKT scores, the LKT hazard score, and other variables were examined using Pearson's correlation coefficient. The distribution of scores was approximately normal, which was tested using Kolmogorov-Smirnov test of normality.

RESULTS

Sample Characteristics

A total of 33 patients participated in the survey and completed the LKT questionnaire, which included 25 women (75.8%) and 8 men (24.3%). The mean age of the sample was 77.8 years, and the mean education level was 10.9 years. The mean duration of treatment was 7.1 years, and the mean lithium level was 0.4. The mean MMSE score of the sample was 26.18. Of the sample, 55% had a diagnosis of treatment-resistant depression; 42% were diagnosed with bipolar affective disorder, of which 18% had bipolar II; and 3% were diagnosed with schizoaffective disorder (Table 1).

Survey Results

Table 2 shows a summary of the data results. The mean score on the LKT was 4.45, which was below the mean score of 6 reported by Peet and Harvey⁷ and suggestive of poor knowledge of lithium in our sample population. The LKT mean hazard score was 5.85, which was above the mean hazard score of 4 in the Peet and Harvey study,⁷ indicating potentially hazardous lack of knowledge.

Association With Patient Characteristics

The mean score on the LKT for men was 5.00 and for women was 4.28, while the LKT hazard scores were 5.50 and 5.96 for men and women, respectively. There was a significant negative correlation between LKT score and hazard score (r=-0.65, P<.01 [1-tailed]). There was a positive relationship between LKT score and lithium level, though not significant (r=0.21, P<.1 [1-tailed]). Relationships between LKT score, LKT hazard score, and age, educational status, diagnosis,

Diagnosis	Patients, n (%)		
Treatment-resistant depression	18.0 (54.5)		
Bipolar affective disorder II	6.0 (18.1)		
Bipolar affective disorder I	8.0 (24.2)		
Schizoaffective disorder	1.0 (3.0)		

and duration of lithium therapy were evaluated, but no significant relationships were found.

DISCUSSION

Our results support the concern that elderly patients, compared to younger adults, have decreased knowledge and increased risk of adverse effects related to lithium therapy. Peet and Harvey,⁷ using a younger adult population, set a LKT score cutoff of 6 and a LKT hazard score of 4 to identify patients at risk due to inadequate knowledge. Patients with lower LKT scores are also the least knowledgeable about intoxication risks as reflected in their increased hazard scores. Smith and Andrews⁸ reported that knowledge of lithium tends to be poor in the elderly. The elderly are also more likely to have higher risks of intoxication than younger patients according to the findings of Dharmendra and Eagles.⁵ The pharmacokinetics of lithium in the elderly and other factors previously summarized in the introduction make higher serum lithium levels more likely in the elderly than in the younger population. The duration of treatment with lithium could also be a factor, as Rosa et al⁹ found that patients' attitudes in general toward lithium became significantly more negative with increasing years of taking lithium. A significant negative correlation with age and the LKT score and a positive correlation between age and the LKT hazard score were also reported by Rosa et al.⁹ The poor knowledge of lithium might also be due to the fact that these patients were not given adequate information on lithium despite being on a regimen of lithium for years.

Dharmendra and Eagles⁵ showed that better knowledge about lithium was associated with more positive attitudes toward lithium as well as treatment adherence. Memory problems are also an important factor to consider in the elderly since ageing is commonly associated with deteriorating memory. Elderly patients with memory problems would have difficulty retaining information given to them and would therefore be at increased risk of lithium toxicity. Anecdotal evidence suggests that lithium should be discontinued in such patients and in patients with early signs of dementia unless patients' medications are being supervised.

This study showed that poor knowledge of lithium could also contribute to lithium toxicity, especially in the elderly, as evident by the poor knowledge of lithium of our sample population as reflected by potentially hazardous scores. Therefore, clinicians need to take this awareness into consideration when commencing patients on lithium. This finding also justifies the importance of patient education regarding symptoms of lithium toxicity and common risk factors.

Table 2. Summary of Data Results for 33 Elderly Patients Receiving Lithium^a

Variable	Mean	SE	Median	Mode	SD
LKT total score	4.45	0.594	5.00	2 ^b	3.410
LKT hazard score	5.85	0.299	6.00	5	1.716
Lithium level, mmol/L	0.4379	0.0259	0.4000	0.4000	0.1399
Age, y	77.82	1.183	78.00	82	6.794
Treatment duration, y	7.12	1.410	4.50	2	7.191

^aLithium level was missing for 4 patients, and treatment duration was missing for 7 patients.

^bMultiple modes exist. The smallest value is shown.

Abbreviations: LKT = Lithium Knowledge Test, SE = standard error of the mean.

In conclusion, the LKT is a brief questionnaire useful in evaluating patients' practical and pharmacologic knowledge of lithium as required for therapy to be safe and effective. Although the LKT measures knowledge, we do not have direct evidence that knowledge measured by the LKT directly translates into change in future difficulties from lithium therapy, which is a limitation of our study.

Our study results highlight the need for patients to be given comprehensive information about lithium prior to treatment commencement and for an ongoing process with refresher educational programs for patients who are on long-term lithium therapy. The information given to patients should be "easy-to-read information" irrespective of their level of education. This process is necessary for effective communication and remains a challenge for clinicians and the system as a whole.

Drug names: lithium (Lithobid and others).

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