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Effect of Age on Chronic Lithium Poisoning

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INTRODUCTION: As lithium is excreted unchanged by the kidneys, any impairment of renal function increases lithium concentration and hence toxicity. The impact of age on chronic lithium poisoning has not previously been studied.

OBJECTIVES: We aimed to determine whether age has an effect on chronic lithium poisoning and determine factors that predict chronic lithium toxicity.

METHOD: We retrospectively compared young (15-64 years old) versus elderly patients ($\geq$65 years old) with lithium concentrations $\geq$1.3mmol/L from three hospitals. Plasma lithium concentrations, lithium dose, medications, symptoms, treatment and outcomes were recorded. Known predictive factors of lithium toxicity were analysed in an ordinal regression analysis to quantify the risk of developing severe toxicity. Creatinine Clearance (CrCL) was calculated using the Cockcroft Gault equation. Lithium clearance (mL/min) was set as $0.161 \times CrCL + 6.47$.

RESULTS: From 2008-2018, 242 patients with elevated lithium concentrations were studied. 83 patients were $\geq$65 years while 159 were between 15-64 years (Table 1). The older group took half the daily dose, had a slightly higher serum concentration, and had lower eGFR and lithium clearance compared to the younger group. There was a significant negative correlation between age and lithium clearance (r=-0.072, p<0.0001), eGFR and lithium toxicity (r=-0.35, p<0.0001), and lithium clearance and toxicity (r=-0.37, p<0.0001). There were more elderly patients with severe renal impairment (17% vs 6%) and toxicity (36% vs 20%) compared with the younger group. There were no lithium-related deaths. Overall, lithium concentration (p<0.0001) and lithium clearance (p=0.03) were found to be important predictors for chronic lithium toxicity.

CONCLUSIONS: Despite lower lithium doses, the elderly group had higher rates of severe toxicity. The increased risk of lithium toxicity in the elderly is due to decreased lithium clearance from multiple factors such as age-related decline in renal function (p<0.0001), drug interactions (p<0.0001) and infection (p=0.0004).