Improving Management of Acute Kidney Injury Due to Lithium Intoxication: Assessing the Role of ChatGPT-4 in Identifying Lithium Preparations AKI & CRRT Conference

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Abstract

This study explores the efficacy of ChatGPT-4, an artificial intelligence model, in identifying lithium preparations to aid in the management of acute kidney injury (AKI) caused by lithium intoxication. The research involved analyzing images of medication, all of which were obtained from the poison control website http://pill-id.webpoisoncontrol.org.

Specifically, 25 images of lithium medications and 25 images of non-lithium medications were processed by ChatGPT-4. The AI's ability to correctly identify medication type, dose, and imprint was assessed.

ChatGPT-4 achieved a 92% accuracy rate in identifying lithium preparations and correctly identified 100% of non-lithium images, demonstrating its effectiveness in distinguishing between lithium and non-lithium medications. However, there were some misidentifications, highlighting the importance of human oversight in the AI-assisted medication identification process.

The study underscores the potential of AI tools like ChatGPT-4 in supporting the management of medication-induced AKI, but also emphasizes the need for cautious integration with human expertise.

Introduction

Prompt recognition and management of medication intoxications, especially in cases of AKI are crucial. Lithium, a common nephrotoxin, poses significant challenges due to its narrow therapeutic index.

The advent of artificial intelligence (AI) presents a novel tool for rapidly identifying these substances, facilitating timely diagnosis and treatment.

This study assess the capacity of AI models, specifically ChatGPT-5, in distinguishing between lithium and non-lithium medications based on image recognition from the poison control database http://pill-id.webpoisoncontrol.org.

Methods and Materials

This study involved analyzing 25 images of various lithium preparations, detailing the medication type, dose, and an assessment of accuracy. An additional 25 non-lithium medication images were included as controls. All images were obtained from the poison control website http://pill-id.webpoisoncontrol.org.

These images were processed by ChatGPT-4 at a resolution of 200 DPI, and the AI's ability to identify medication type, dose, and imprint was assessed. The performance was benchmarked against verified data from http://pill-id.webpoisoncontrol.org.

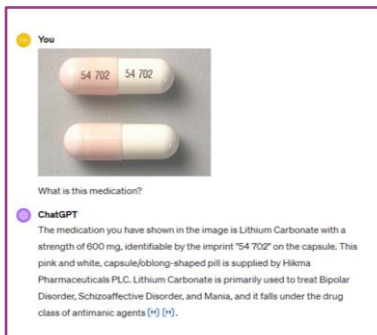


Figure 2. Correct Capsule Identification

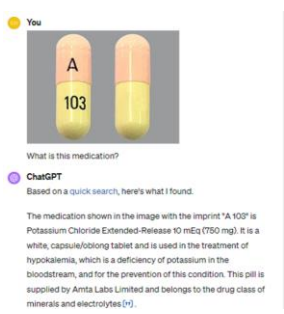


Figure 3. Incorrect Capsule Identification

Figure 4 Incorrect Capsule Identification

Results

ChatGPT-4 demonstrated a high accuracy rate (92%), correctly identifying 23 of 25 lithium medication preparations **(Figure 2)**, which is critical in managing medication-induced AKI.

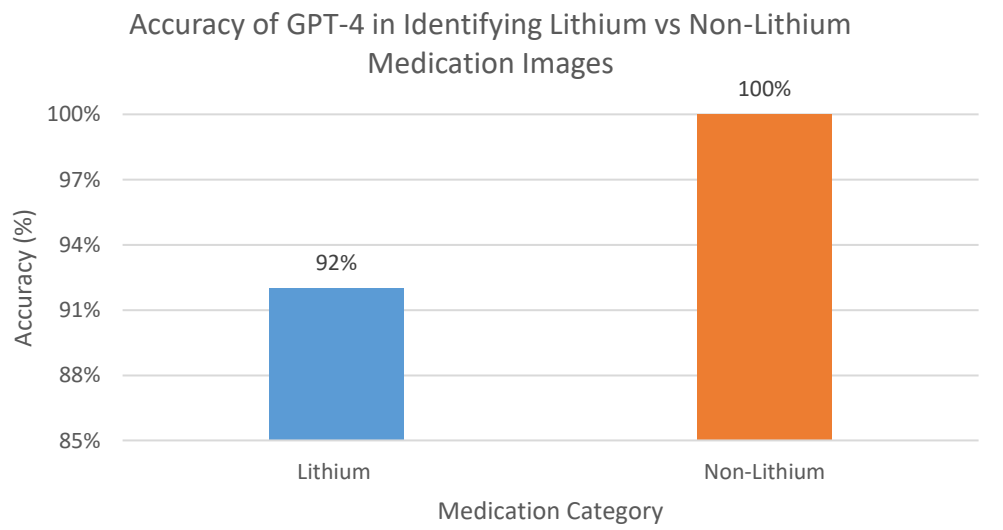
ChatGPT-4 accurately identified 100% of the non-lithium medications, indicating its efficacy in distinguishing between lithium and non-lithium medications.

Misidentifications accounted for 8% of the lithium preparations, where specific cases included misidentifying lithium carbonate 600mg with potassium chloride ER 750mg **(Figure 3)** or lithium carbonate 300mg for bupropion 300mg **(Figure 4)**.

Figure 1: ChatGPT-4 Accuracy in Identifying Lithium and Non-Lithium Medications

N =	Lithium Preparation per Poison Control	Medication per GPT-4	Dose per GPT-4	Type	Imprint per Poison Control	Imprint per GPT-4	GPT-4 Correct vs Incorrect
1	Lithium Carbonate 600 mg	Lithium Carbonate	600 mg	capsule	54 702	54 702	Correct
2	Lithium Carbonate 450 mg	Lithium Carbonate	450 mg	tablet	54 346	54 346	Correct
3	Lithium Carbonate 150 mg	Lithium Carbonate	150 mg	capsule	54 213	54 213	Correct
4	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	tablet	54 107	54 107	Correct
5	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	capsule	APO 300	APO 300	Correct
6	Lithium Carbonate 600 mg	Lithium Carbonate	600 mg	capsule	G222 600	G222 600	Correct
7	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	capsule	G221 300	G221 300	Correct
8	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	capsule	West-ward 3189	West-ward 3189	Correct
9	Lithium Carbonate 150 mg	Lithium Carbonate	150 mg	capsule	H 97	H 97	Correct
10	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	capsule	H 98	H 98	Correct
11	Lithium Carbonate 600 mg	Lithium Carbonate	600 mg	capsule	H 141	H 141	Correct
12	Lithium Carbonate 150 mg	Lithium Carbonate	150 mg	capsule	West-ward 3188	West-ward 3188	Correct
13	Lithium Carbonate ER 450 mg	Lithium Carbonate ER	450 mg	tablet	WW 277	WW 277	Correct
14	Lithium Carbonate ER 300 mg	Lithium Carbonate ER	300 mg	tablet	223	223	Correct
15	Lithium Carbonate ER 450 mg	Lithium Carbonate ER	450 mg	tablet	224 G	224 G	Correct
16	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	tablet	430	430	Correct
17	Lithium Carbonate 150 mg	Lithium Carbonate	150 mg	capsule	G220 150	G220 150	Correct
18	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	tablet	54 452	54 452	Correct
19	Lithium Carbonate 300 mg	Lithium Carbonate	300 mg	capsule	54 463	54 463	Correct
20	Lithium Carbonate ER 300 mg	Lithium Carbonate ER	300 mg	tablet	M LC 300	M LC 300	Correct
21	Lithium Carbonate ER 300 mg	Lithium Carbonate ER	300 mg	tablet	LITHOBID 300	LITHOBID 300	Correct
22	Lithium Carbonate 150 mg	Lithium Carbonate	150 mg	capsule	WW 3188	WW 3188	Correct
23	Lithium Carbonate 150 mg	Lithium Carbonate	150 mg	capsule	A 101	A 101	Correct
24	Lithium Carbonate 600 mg	Potassium Chloride ER	750 MG	capsule	A 103	A 103	Incorrect
25	Lithium Carbonate 300 mg	Bupropion	300 mg	capsule	A 102	A 102	Incorrect

C =	Non-Lithium Medication per Poison Control	Medication per GPT-4	Dose per GPT-4	Type	Imprint per Poison Control	Imprint per GPT-4	GPT-4 Correct vs Incorrect
1	Losartan potassium 50 mg	Losartan potassium	50 mg	tablet	952	952	Correct
2	Ketrolac 10 mg	Ketrolac	10 mg	tablet	M 134	M 134	Correct
3	Simethicone 80 mg	Simethicone	80 mg	tablet	44 137	44 137	Correct
4	Pantoprazole sodium DR 20 mg	Pantoprazole sodium DR	20 mg	tablet	93/11	93/11	Correct
5	Loperamide HCl 2 mg	Loperamide HCl	2 mg	capsule	N 020 2	N 020 2	Correct
6	Lisinopril 20 mg	Lisinopril	20 mg	tablet	3760	3760	Correct
7	Chlorthalidone 50 mg	Chlorthalidone	50 mg	tablet	M 75	M 75	Correct
8	Furosemide 40 mg	Furosemide	40 mg	tablet	54 583	54 583	Correct
9	Hydrochlorothiazide 25 mg	Hydrochlorothiazide	25 mg	tablet	LL H 14	LL H 14	Correct
10	Metoprolol succinate ER 50 mg	Metoprolol succinate ER	50 mg	tablet	369	369	Correct
11	Aspirin 325 mg	Aspirin	325 mg	tablet	TCL 011	TCL 011	Correct
12	Gabapentin 600 mg	Gabapentin	600 mg	tablet	G 31	G 31	Correct
13	Calcitriol 0.5 mcg	Calcitriol	0.5 mcg	capsule	93 658	93 658	Correct
14	Carvedilol 25 mg	Carvedilol	25 mg	tablet	R 255	R 255	Correct
15	Cinacalcet HCl 30 mg	Cinacalcet	30 mg	tablet	WPI 16	WPI 16	Correct
16	Torsemide 100 mg	Torsemide	100 mg	tablet	par 654	par 654	Correct
17	Allopurinol 300 mg	Allopurinol	300 mg	tablet	MP 80	MP 80	Correct
18	Enalapril maleate 10 mg	Enalapril maleate	10 mg	tablet	M E17	M E17	Correct
19	Prazosin 5 mg	Prazosin	5 mg	capsule	93 4069	93 4069	Correct
20	Sevelamer HCl 800 mg	Sevelamer	800 mg	tablet	G 447	G 447	Correct
21	Spironolactone 100 mg	Spironolactone	100 mg	tablet	G 5013	G 5013	Correct
22	Amlodipine besylate 5 mg	Amlodipine besylate	5 mg	tablet	G 1530 5	G 1530 5	Correct
23	Calcium acetate 667 mg	Calcium acetate	667 mg	capsule	54 215	54 215	Correct
24	Metoprolol tartrate 100mg	Metoprolol tartrate	100 mg	tablet	N 734 100	N 734 100	Correct
25	Ramipril 10 mg	Ramipril	10mg	capsule	54 602	54 602	Correct



Conclusions

This study highlights the potential of ChatGPT-4 as an innovative tool in the rapid identification of nephrotoxic drugs or those cleared by the kidney, leveraging images from a poison control database. The high accuracy rate of ChatGPT-4 in identifying various lithium preparations underscores its utility in enhancing the management of drug-induced AKI, particularly in the context of lithium intoxication. Despite its promising performance, the occasional misidentifications stress the importance of integrating AI-assisted drug identification with human expertise to ensure accuracy and safety in clinical decision making.

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