Eurasian Journal of
Anesthesiology & Intensive Care
Review
doi
10.51271/EAJAIC-0043

A case report of quetiapine intoxication in our intensive care unit and literature review

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Cite this article: Yıldız N, Karadayı S, Göktürk A, Andıran Şenaylı Y. A case report of quetiapine intoxication in our intensive care unit and literature review . *Eur J Anesthesiol Intens Care.* 2025;2(4):129-133.

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Received: 28/08/2025 ◆ **Accepted**: 06/10/2025 ◆ **Published**: 13/11/2025

ABSTRACT

Quetiapine is one of the atypical antipsychotic drugs that is widely used, especially in psychiatric practice. There are case reports of quetiapine overdose in the literature. In this article, we present the case of intensive care management of an adult male patient after high-dose quetiapine intake with the help of the current literature. A systematic literature review was conducted along with the case report. The PubMed, Web of Science, and Scopus databases were searched for "quetiapine intoxication," yielding 25 articles. Of the twenty-one quetiapine overdose articles, 1963 cases were identified. The mean age of the cases was 34.5 years, and the cases were predominantly female. The patients were more likely to have a diagnosis of depression. The mean dose was calculated to be 9.6 g. The most common neurological findings were coma and accompanying seizures. Cardiovascular (CVS) findings included tachycardia, hypotension, and QTc prolongation. Since quetiapine does not have an active antidote, activated charcoal and gastric lavage are typically administered to patients after they present to the emergency department. Intubation was required in severe cases. Mortality was 31 in 1693 cases (1%). Three patients used alcohol together with quetiapine. Rhabdomyolysis developed in 14 patients. Neuroleptic malignant syndrome (NMS) developed in 2 patients, and acute respiratory distress syndrome (ARDS) due to quetiapine use in 1 patient. In a case report, carboxyhemoglobin (COHb) elevation was detected as a result of the use of quetiapine together with zolpidem. In cases of quetiapine intoxication, patients should be monitored in the ICU due to the development of life-threatening conditions, including neurological, CVS, and renal system effects of the drug. There is no specific antidote. Therefore, patients may need supportive treatments. This study was associated with significant toxicity and dangerous complications in quetiapine overdose. In more severe overdose cases, careful and often prolonged clinical observation is required.

Keywords: Quetiapine intoxication, intensive care unit, suicide

INTRODUCTION

Quetiapine is a frequently prescribed antipsychotic and is therefore frequently overdosed. The clinical picture is characterized by a variable combination of peripheral and central symptoms, with agitation frequently occurring.[1]

Quetiapine interacts as an antagonist with a wide range of neurotransmitter receptors in the brain. It has been proposed that its antipsychotic activity is mediated through a combination of dopamine type 2 (D2) and serotonin type 2 (5-HT2) antagonism. It also has high affinity for α1-adrenergic and histamine receptors, but lower affinity for muscarinic receptors. However, as with other antipsychotic drugs, the exact mechanism of action of quetiapine is still unknown. The average therapeutic dose concentration is 0.4 mg/L; a dose of 200-750 mg per day can be administered. The pharmacologic effect of the drug causes the signs and symptoms of overdose. Antagonism of histamine H1 receptors causes sedation and somnolence. Orthostatic dysregulation, hypotension, and tachycardia are due to an antagonistic effect on α1-adrenergic receptors. Quetiapine also causes anticholinergic-mediated tachycardia due to an antagonistic effect on M1-muscarinic receptors. Overdose also causes QTc (cardiac QT interval, when the standard heart rate is 60/minute) prolongation, respiratory depression, status epilepticus, rhabdomyolysis, confusion, coma, and death.[2]

The elimination half-lives of quetiapine and its active metabolite, norquetiapine, are approximately 7 and 12 hours, respectively. In the event of an acute overdose, standard precautions include airway protection, adequate oxygenation, and ventilation.[3]

Quetiapine has no known antidote. Treatment of intoxication is mainly supportive. Physostigmine is described as a specific treatment for anticholinergic delirium/toxidrome. The efficacy of other pharmacologic interventions remains unclear.[1]

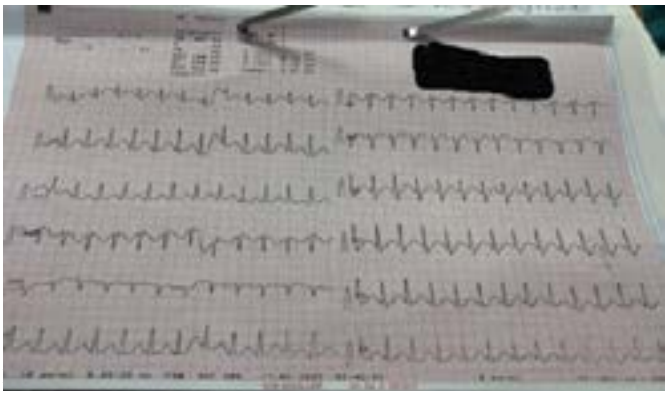
The case we present here only involves the intensive care follow-up and treatment of a patient who developed elevated COHb after an overdose of quetiapine. When we look at the literature, patients with elevated COHb have taken other medications along with quetiapine. However, in our case, elevated COHb was detected only after the use of quetiapine was initiated.

METHODS

A systematic literature review was conducted along with the case report. The PubMed, Web of Science, and Scopus databases were searched for "quetiapine intoxication," yielding 25 articles.

CASE REPORT

A 42-year-old male patient was brought to the emergency department (ED) by his relatives in a state of sleepiness. According to the anamnesis taken from the patient, it was learned that he had taken 20 quetiapine 200 mg for suicidal purposes within approximately 1 hour. The patient's Glasgow Coma Scale (GCS) score was 11 at the time of presentation to the ED and subsequently decreased to 8, at which point the patient was intubated in the ED. During the ED follow-up, the patient's GCS decreased to 8, and his breathing pattern deteriorated. His breathing became superficial, and his respiratory rate gradually decreased. For this reason, the patient was intubated by the ED physician due to the development of respiratory acidosis in the arterial blood gas. ECG performed in the ED showed a heart rate of 155 beats/min, QTc 514 ms (prolonged) (Figure 1),blood pressure of 140/78 mmHg, SpO_2 of 99%, and urine output of 100 cc/h. In the ED, after gastric lavage was performed, 8-10 pieces of drug residue were detected along with food residues.



Therefore, activated charcoal administration was performed by nasogastric gastric lavage. We will talk about our management in our intensive care unit after the patient, who was followed up with a diagnosis of depression and had no other comorbidities, took 20 quetiapine 200 mg (4 gr) for suicidal purposes.

The patient was intubated in the ED and then transferred to our intensive care unit. The patient's general condition was poor, with a closed consciousness and a GCS of 3. After the patient was intubated in the emergency room, he was quickly transferred to the intensive care unit. During the neurological examination performed in the intensive care unit, the GCS was determined to be 3. Although the reason for the low GCS was attributed to the sedative and neuromuscular blocking drugs administered during intubation, the progressive decrease in the GCS of the ED patient prevented us from making a clear distinction. The patient was connected to a mechanical ventilator, with the following settings: PEEP 5 cmH_2O, FiO_2 50%, and tidal volume 500 ml in SIMV mode. Upon admission to the intensive care unit, the heart rate was 120 beats/min, the blood pressure was 140/85 mmHg, the SpO_2 was 99%, and the respiratory sounds were normal bilaterally. The abdomen was relaxed, and urine output was 100 cc/h. Laboratory values of the patient before emergency room admission, ICU admission, and ICU discharge are given in Table 1.

Table 1. Laboratory values of the patient

	Emergency room admission	ICU admission	ICU output
Glucose mg/dl	113	108	107
Urea mg/dl	11	11	21
Creatinine mg/dl	0.96	0.93	1.15
SGPT U/L	11	12	12
SGOT U/L	18	20	16
LDH U/L	118	208	-
GGT U/L	18	17	-
Creatine kinase (CK) U/L	18	-	-
C-reactive protein (CRP) g/L	0.8	0.8	12.8
Sodium mmol/L	139	139	144
Potassium mmol/L	3.3	3.8	4,5
Chlorine mmol/L	102	103	105
GFR ml/min/1, $73m^2$	96	100	78
White blood cell $x10^9$/L	8.4	6.3	12.8
Hemoglobing/dl	15.8	14.8	14.1
Platelet $x10^9$/L	187	184	167
Troponin ng/L	4	-	-
PH	7.32	7.45	7.39
PCO_2 mmHg	45	28	50
PO_2 mmHg	96	23	46
BE mmol/L	2.9	2.5	4.4
HCO_3 mEq/L	23	19	30
Lactate mg/dl	42	44	14
COHb %	13	8.3	1.8
APTT sec	20	26	-
PTT sec	14	15	14
INR	1.03	1.1	1.06

ICU: Intensive care unit, SGPT: Serum glutamic-pyruvic transaminase, SGOT: Serum glutamic-oxaloacetic transaminase, LDH: Lactate dehydrogenase, GGT: Gamma-glutamyl transferase GFR; Glomerular filtration rate, BE: Base excess, APTT: Active partial thromboplastin time, PTT: Prothrombine time

Since quetiapine has no known antidote, supportive treatment was provided in our intensive care unit. The patient was hydrated with 100 cc/h of balanced fluid; sedative drugs were not used. Ulcer and deep vein thrombosis prophylaxis was applied. The patient regained consciousness and started breathing spontaneously on the 20th hour of his admission to our intensive care unit, and was extubated in a controlled manner. No cardiac or hepatic complications were observed during the patient's follow-up. He also did not require dialysis. The patient, who had no problems during follow-up after extubation, was transferred to the psychiatric service with recommendations.

LITERATURE REVIEW

Pubmed, Web of Science, and Scopus databases were searched to identify cases of quetiapine intoxication. Twenty-three articles were found by searching ''quetiapine intoxication''. The terms "case report" or "case series" were used. A comprehensive search of the relevant literature was conducted, including letters to the editor and review articles.

One thousand nine hundred sixty-three cases were identified from 21 quetiapine overdose articles. The characteristics of these cases are summarized in Table 1. The mean age of the cases was 34.5 years, and the cases were predominantly female. Patients were primarily diagnosed with depression. The mean dose was approximately 9.6 g. The most common neurologic finding was coma and accompanying seizure. CVS findings included tachycardia, hypotension, and QTc prolongation. Quetiapine was not administered because it lacks an active antidote. Supportive treatment/drug excretion-enhancing interventions were performed. Activated charcoal and gastric lavage were mainly administered after admission to the ED. Intubation was needed in severe cases. Mortality was 31 out of 1693 cases (1%). Three patients used alcohol with quetiapine. Fourteen patients developed rhabdomyolysis. 2 patients developed NMS, and one patient developed ARDS due to quetiapine use.

When we reviewed the literature, the case report by Quinn et al. (2009) found elevated COHb as a result of quetiapine use with zolpidem. In the case report by Ninčević et al. (2017), liver function tests and CK values were found to be elevated. In the follow-up of this patient, rhabdomyolysis, NMS, and the need for hemodialysis developed. In a case series by Dobravc et al./2024, hypopotassemia was found in 17 patients and acidosis in 19 patients. Hypopotassemia was also reported in a case study by Gajwani et al. (2000). Elevated CK was found in a case report by Müller et al. [2-22] in 2010 (Table 2, 3).

Table 2. Patient demographics and clinical presentation

Article/year	Number of cases	Age	Sex	Diagnosis	Dose	Neurological
Bertol et al. v. 2021[2]	1	75	Male	Depression/ bipolar	28 g	Coma
Caterina et al./2022[3]	1	64	Female	Depression	Unknown	Coma
Cetin et al. 2011[4]	1	21	Female	Depression	18 g	Coma-Seizure
Quinn et al/2009[5]	1	57	Female	Unspecified	Unspecified Coma	
Harmon et al/1998[6]	1	26	Female	Unspecified	10 g	Coma
Hunfeld et al/2006[7]	14	Unspecified	Unspecified		1.2-18 g	Coma
Jiaoyang et al./2025[8]	1	26	Male	Depression	500 mg	Coma
Peridy et al. /2019[9]	372	Unspecified	Unspecified		1500 mg and above	Coma
Ninčević et al. v. 2017[10]	1	32	Male	Bipolar	24 g	Coma
Dobravc et al. v./2024[11]	134	32.5 (average)	42% Male	Unspecified	10 g (average)	Coma-Seizure
Corrine et al/2003[12]	18	31 (average)	34% Male	Unspecified	3.5 g (average)	511 Seizure
Hustey /1999[13]	1	19	Male	Schizophrenia depression	9.6 g	Coma
Gajwani et al. 2000[14]	1	19	Male	Schizophrenia depression	10 g	Coma
Adelina et al/2008[15]	945	35 (average)	Unspecified		Unspecified	10% Coma
Precourt et al/2005[16]	1	53	Male	Unknown		Unspecified Coma-Seizure
Pfab et al. 2011[17]	20	Unspecified	15% Male	Unspecified	9.8 g (average)	100% Coma 20% Seizure
Isbister et al/2009[18]	176		Unspecified	Unspecified	Unspecified 48% Coma	
Fernandes et al/2002[19]	1	52	Male	Schizophrenia	10.800 mg	Coma
Strachan et al.2012[20]	1	41	Male	Bipolar	4500 mg	Coma
Mattoo et al/2009[21]	1	23	Female	Schizophrenia depression	1400 mg	Sommolance
Müller et al.2010[22]	1	32	Female	Unspecified	36 g	Coma

Table 3. Patient clinical presentation

Article/year	Intubated	Cardiological	Lavage/coal	Mortal	Feature
Bertol et al. v. 2021[2]	Yes	QTc prolongation	Yes	Yes	CPR
Caterina et al./2022[3]	Yes	Unspecified	Unspecified	No	Hemadsorption
Cetin et al. 2011[4]	Yes	Tachycardia	Yes	No	Concomitant use with alcohol
Quinn et al/2009[5]	Yes	Unspecified	Unspecified	No	Concomitant use with alcohol and zolpidem- COHb elevated
Harmon et al/1998[6]	Yes	Tachycardia	Unspecified	No	Unspecified
Hunfeld et al/2006[7] Jiaoyang et al./2025[8] Peridy et al. /2019[9] Ninčević et al. v. 2017[10]	Yes Yes Yes	Unspecified tachycardia No Tachycardia Tachycardia	Unspecified Yes Unspecified Yes	No No 0.13% ex No	Unspecified acute kidney injury Rhabdomyolysis hemodialysis Unspecified Concomitant use with alcohol - NMS -Rhabdomyolysis hemodialysis
Dobravc et al. v./2024[11]	72% Yes	93% tachycardia	Yes	12% ex	Rhabdomyolysis
Corrine et al/2003[12]	22% Yes	55% QTc prolongation	Unspecified	No	Unspecified
Hustey /1999[13]	Yes	Tachycardia	Yes	No	Unspecified
Gajwani et al. 2000[14]	Yes	Tachycardia QTc prolongation	Unspecified	No	Unspecified
Adelina et al/2008[15]	5% Yes	56% tachycardia	Unspecified	0.03%	Unspecified
Precourt et al/2005(16)	Yes	QTc prolongation	Yes	No	Venlafaxine Concomitant use NMS
Pfab et al. 2011 [17]	70% Yes	60% tachycardia 65% QTc prolongation	Unspecified	5% mortal	Unspecified
Isbister et al/2009[18]	Unspecified	67% tachycardia	Unspecified	Unspecified	Unspecified
Fernandes et al/2002[19]	Yes	Hypotension	No	Yes	CPR
Strachan et al. 2012[20]	Yes	QTc prolongation	Unspecified	Unspecified	ARDS
Mattoo et al/2009[21]	No	Tachycardia	Yes	No	Unspecified
Müller et al. 2010[22]	Yes	Tachycardia	Yes	No	Unspecified

DISCUSSION

In this case, we describe the management of a 42-year-old male patient in our intensive care unit after he took 20 200 mg (4 g) quetiapine for suicidal purposes. Our patient was intubated in our ICU after a coma due to quetiapine intoxication. When the laboratory parameters of our patient were evaluated, respiratory acidosis, hypopotassemia, and elevated COHb were detected on admission to the ICU. Renal function tests, liver function tests, and CK value were found to be normal at the time of admission to AS and during discharge from the ward.

In a case report by Quinn et al.[5] in 2009, a 57-year-old female patient had used quetiapine along with zolpidem, oxycodone, citalopram, and alcohol for suicidal purposes. As a result, elevated COHb was found. In our case, COHb elevation was also observed due to the isolated use of quetiapine. In quetiapine intoxication, care should be taken in terms of COHb elevation and findings of carbon monoxide intoxication.

In a case report by Caterina et al.[3] in 2022, a patient who developed coma after quetiapine overdose was successfully treated by using hemadsorption. Since quetiapine has no known antidote, this method was used as a treatment option.

The systems most commonly affected by quetiapine overdose are the neurologic and CVS systems. In many patients, coma and seizure have been reported due to unconsciousness.

Hypotension, tachycardia, and QTc prolongation as CVS side effects occurred in many patients. Since these effects were life-threatening, patients needed supportive treatment (CPR, intubation, vasopressor use, hemodialysis, etc.) in intensive care units.[2-22]

In the literature, patients who developed acute kidney injury, rhabdomyolysis, and NMS in some patients due to overdose of quetiapine have been mentioned. In some of these patients, hemodialysis was used for treatment. Care should be taken in terms of renal damage, rhabdomyolysis, and NMS in quetiapine intoxication.[8,10,11,16] We did not observe these conditions.

Strachan et al.[20] reported that ARDS developed in a 41-year-old male patient in a case report in 2012.

Some cases of a mortal course of overdose of quetiapine have also been reported.[2,9,11,15,17,19] Quetiapine has been on the market for twenty-five years. It is encountered more frequently in autopsies due to increased abuse, prescription outside of approved indications, and availability without a prescription. It has been associated with increased mortality rates, most likely due to its adverse effects on the CVS system.[23]

In quetiapine intoxication, patients should be followed up in the ICU due to the development of life-threatening conditions due to neurologic, CVS, and renal system effects. Therefore, patients may need supportive therapies. In this study, quetiapine overdose was associated with significant toxicity and dangerous complications. In more severe cases of overdose, careful and often prolonged clinical observation is required.

ETHICAL DECLARATIONS

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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