RESEARCH PAPER

# Neuroleptic Malignant Syndrome and Influence of Heat Wave: A Case Series

**Dr Manisha Chauhan[1*], Prof (Dr) Jai Singh Yadav[2], Dr Khan Abdul Malik[3]**

[1*]MBBS, MD, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India
Email: manishachauhan464@gmail.com
[2]MBBS, MD, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India
Email: jsypsyjai@gmail.com
[3]MBBS, Demonstrator in Department of Psychiatry, GSVM Medical College, Kanpur, India
Email: KhanMalikbsmu@gmail.com

Received: 15th Jul, 2026 | Revised: 25th Jul, 2026 | Accepted: 5th Aug, 2026 | Available Online: 12th Aug, 2026

**ABSTRACT**

**AIM:** Assess the incidence rates of NMS during periods of extreme heat compared to standard climatic conditions.

**METHODOLOGY :** 3 cases of patient admitted during high heat wave referred from emergency department on anti-psychotic treatment with provisional diagnosis of NMS were assessed.

**RESULT :** all three patients exhibited significant symptoms indicative of Neuroleptic Malignant Syndrome (NMS), such as extremely high fevers of 103-104°F, rigidity in both upper and lower limbs, altered sensorium, and confusion. These symptoms occurred within the context of a heat wave, with city temperatures ranging from 40 to 45 degrees Celsius, suggesting a possible correlation between heat exposure and the onset of NMS.

**DISCUSSION** Studies have shown that systemic and metabolic factors, including agitation, exhaustion, and dehydration, may increase the risk for NMS

**CONCLUSION** This case series highlights the importance of recognizing NMS in the context of environmental stressors like heat waves. While NMS is primarily related to neuroleptic medications, external factors such as high temperatures can exacerbate the risk

**How to cite this article:** Manisha Chauhan1* Prof (Dr) Jai Singh Yadav2 Dr Khan Abdul Malik3. Neuroleptic Malignant Syndrome and Influence of Heat Wave: A Case Series. Int J Drug Deliv Technol. 2026;16(76s):2259-2262. DOI: 10.25258/ijddt.16.76s.227.

## INTRODUCTION

Introduction:

Neuroleptic malignant syndrome (NMS) is a serious condition that can happen when someone quickly stops taking dopaminergic drugs or has a bad reaction to drugs that block dopamine receptors. The initial recorded instance of NMS transpired in 1956, shortly following the advent of the antipsychotic drug chlorpromazine (Thorazine) 1. There were more case reports after that, and in a 1960 study, French doctors called the syndrome "syndrome malin des neuroleptiques" because it was caused by the new neuroleptic haloperidol. This is how the syndrome got its current name. Based on aggregated data from 1966 to 1997, the prevalence of Neuroleptic Malignant Syndrome (NMS) varied between 0.2% and 3.2% among psychiatric inpatients undergoing neuroleptic treatment. However, the incidence has recently diminished to between 0.01% and 0.02% due to increased awareness among physicians and the availability of newer neuroleptic agents.

NMS is an uncommon but potentially fatal adverse reaction primarily linked to first-generation antipsychotic medications. It is often missed in people who have a fever. Heat stroke often causes fever and a change in consciousness, but it can be recognised by its sudden onset and the fact that it is more likely to cause dry skin, low blood pressure, and limp limbs instead of extrapyramidal signs. It can be hard to tell NMS apart from other disorders that have similar symptoms or from more common extrapyramidal side effects of antipsychotics (5–7). Even though NMS is a rare neurological condition, hospitalists must be aware of it because early diagnosis and proper medical care are essential for improving patient outcomes. NMS is hard to predict and could be deadly.

Case Report #1

According to her family, a 20-year-old woman from a lower socioeconomic background was healthy until she became pregnant with her first child. At six months pregnant, she started to get angry with her in-laws, even though her vegetative functions were normal at the time. After giving birth to her child in September 2023, she became very irritable, stopped talking to people as much, and didn't respond well to her child, even though her other functions seemed to be fine. Four months later, she started talking to herself, staying in her room, and acting more and more violent and aggressive toward her family. She also wouldn't let her baby nurse. Her symptoms kept getting worse, so on November 6, 2024, she was

taken to a private psychiatrist in Ranchi. She received an intramuscular injection of Zuclopenthixol Depot (200mg) along with Trifluoperazine (5mg), Trihexyphenidyl (2mg BD), and Quetiapine (25mg).
She started throwing up two days after treatment and had a fever of 103°F. She also had one episode of faecal and urinary incontinence. These symptoms were also linked to spastic contractions in all four limbs, tremors in the fingers, and rolling of the eyeballs upward, as well as an inability to support her. She ate and drank a lot less, and her speech became slurred. She was brought to the IMS BHU emergency room, where she didn't know where she was, what time it was, or who she was with.
She was given antipyretics and maintenance fluids and sent to the neurology department, where they made a temporary diagnosis of neuroleptic malignant syndrome. Then, she was moved to the psychiatry department. When she was examined, she had a blank stare, didn't respond well to verbal commands, spoke with a slurred voice, and had stiff limbs. Her psychomotor activity was greatly reduced, and she was confused about time, place, and people. Her mood was low, and she didn't get along with anyone, so Kirby's method was used.
In Kirby's method, she sometimes got upset and needed help with dressing and feeding. She was resistant, and her face showed that she was upset all the time. She could see a light source with her eyes, but she had trouble following simple commands. There was no emotional responsiveness to family members, and there was no spontaneous speech.
We did baseline tests, which included CPK. Her tests showed that her electrolytes were out of whack, her serum CPK was 1783 IU/L, and her GCS score was E4V1M4. She was given 2.5 mg of Bromocriptine twice a day, along with maintenance fluids, 1 amp of Inj. Phenergan twice a day, and 4 mg of Trihexyphenidyl a day.
After two days, she was able to eat and drink more, and her speech went from single words to full sentences. Her stiffness went down, her temperature was 99.4°F, and her serum CPK level on 26/7/24 was 1354 IU/L. Upon examination, tremors in both limbs had diminished.

Report on Case 2

A 16-year-old male was presented to the psychiatry outpatient department with grievances of aggressive and abusive conduct, obstinacy, and a deteriorating capacity to concentrate on academic pursuits and mathematical skills over the preceding four years. He had been taking 2mg of risperidone and 5mg of olanzapine for the last two years, as well as 2mg of Trihexyphenidyl (THP). Even though the medications helped with his symptoms, they came back after he stopped taking them for 15 days. He was taken back to the psychiatry department and given 2mg of THP and 4mg of risperidone. About a week later, he got a fever of 104°F, became confused, stiff, and had a different sense of smell. He was taken to the medicine department with a possible case of meningitis, but no more tests were done on his CSF. General and systemic examinations demonstrated generalised rigidity in all extremities, accompanied by a negative Kernig's sign. His CPK was high, and they figured out he had NMS.
The patient was given Bromocriptine 2.5mg twice a day, which was later lowered, along with Phenergan 25mg twice a day and Quetiapine 50mg at night. He was moved to the psychiatry department because he was more agitated, talking about things that didn't matter, and not eating enough. Bromocriptine was slowly lowered and then stopped as his NMS symptoms got better. Quetiapine, on the other hand, was raised. His sleep got better, and he was less agitated, and he ate better.

Case Report #3

A 33-year-old man with 14 years of history of schizophrenia and of taking medication came to the Psychiatric OPD at the Institute of Medical Sciences, BHU. According to attendants He from past two days had complaints of a high-grade fever, stiffness in both his arms and legs, slurred speech,confusion and swelling all over his body. He said he had been in heat waves recently. Because they knew how serious his condition was, he was quickly admitted to the Psychiatric IPD for more tests and treatment. When they got there, all of their current antipsychotic medications were stopped. For the past five months, a private psychiatrist had given him Risperidone (4mg), Olanzapine (5mg), Trihexyphenidyl(4mg), and Divalproex (300mg). The medical staff gave Phenergan (10mg) and told the patient to take Bromocriptine (2.5mg) and LR (21mg). He got the medications and IV fluids while he was in the hospital. After nine days of full care, his vegetative functions returned to normal and his symptoms got a lot better.

Discussion

In this case series, all three patients displayed pronounced symptoms characteristic of Neuroleptic Malignant Syndrome (NMS), including markedly elevated fevers of 103-104°F, rigidity in both upper and lower extremities, altered sensorium , and confusion. During a heat wave, when temperatures in the city were between 40 and 45 degrees Celsius, these symptoms appeared. This suggests that being around heat may have something to do with the start of NMS.

NMS Traits and Risk Elements

NMS is a rare but dangerous reaction to antipsychotic drugs that can cause hyperthermia, muscle stiffness,

problems with the autonomic nervous system, and changes in mental status. It usually happens because of blocking dopamine receptors. NMS can occur in patients irrespective of previous tolerance to neuroleptics; however, the concurrent presence of various stressors, including medication alterations and elevated environmental temperatures, may elevate the risk.

Heat and NMS

Heat stroke, which happens when you are exposed to high temperatures for a long time, can cause many problems with your body, including problems with your central nervous system. For people who already have mental health problems and are taking antipsychotic medication, heat stress may make them more vulnerable and raise the risk of NMS. Hyperthermia, changes in mental status, and muscle rigidity are some of the signs that heat stroke and NMS have in common, which makes it harder to tell them apart.

In these instances, the patients' markedly elevated fevers and rigidity are more indicative of NMS than traditional heat stroke, although the simultaneous heat wave likely contributed to the worsening of their conditions. For example, dehydration caused by heat could have played a role in the development of NMS by changing how the body regulates temperature and raising the levels of antipsychotic drugs in the blood. Hospitalisation is often necessary to keep an eye on vital signs, keep the patient hydrated, and ease symptoms. You might be able to control your symptoms with drugs like muscle relaxants, benzodiazepines, and dopamine agonists. In serious cases, you may need to go to the intensive care unit.

Things to think about with medicine

All of the patients were taking neuroleptic drugs, which are known to increase the risk of NMS. The first case used Zuclopenthixol, Trifluoperazine, and Quetiapine; the second case used Risperidone and Olanzapine; and the third case used Risperidone, Olanzapine, Trihexyphenidyl, and Divalproex. The emergence of NMS symptoms soon after alterations or commencement of medication highlights the essential function these drugs serve in the syndrome's pathogenesis.

Research has shown that systemic and metabolic factors, such as agitation, exhaustion, and dehydration, may make it more likely that someone will get NMS. A study indicated that physical exhaustion and dehydration preceded the onset of NMS in all 14 patients examined. Another study found that eight out of nine NMS patients were dehydrated before the syndrome started9. A case-controlled study found that agitation and dehydration were strongly linked to NMS10. Moreover, a study indicated that clozapine, risperidone, olanzapine, and quetiapine were linked to the recurrence of definitive or potential symptoms of Neuroleptic Malignant Syndrome (NMS) in patients with a prior episode of NMS.

Management and Results:

NMS needs to be recognised and treated quickly. The main ways to treat this are to stop taking neuroleptics right away, give supportive care to control hyperthermia and dehydration, and use drugs like Bromocriptine, which is a dopamine agonist, and Dantrolene, which is a muscle relaxant. In these instances, Bromocriptine was effectively employed to alleviate symptoms, supplemented by supportive interventions including hydration and antipyretics.

Possible differential diagnoses include CNS infections, mass lesions, fatal catatonia, severe extrapyramidal reactions, anti-cholinergic or lithium toxicity, heat stroke, and malignant hyperthermia. A similar study found one case of hypothermia linked to olanzapine and quetiapine12.

CONCLUSION:

This case series shows how important it is to recognise NMS in situations where there are environmental stressors, like heat waves. NMS is mostly linked to neuroleptic drugs, but things like high temperatures can make the risk worse. Clinicians need to keep a close eye on patients who are taking antipsychotic drugs, especially when the weather is bad. To improve outcomes and lower the death rate in NMS patients, it is important to diagnose them early and give them complete care. Additional investigation into the interaction between environmental factors and NMS may yield more profound insights into prevention and treatment methodologies.

**DECLARATION SECTION**

**Declaration of Conflicting Interests**- The authors stated that they have no conflicts of interest regarding the research, authorship, and publication of this article.

**Funding**- The authors did not receive any financial support for the research, authorship, and publication of this article.

**Statement of Informed Consent and Ethical Approval –** The authors confirm that they have obtained all necessary patient consent forms, including consent for the use of photos and videos of the patients.

CONSENT FOR PUBLICATION: authors confirm that they are giving complete consent for publication

ACKNOWLEDGEMENTS : Not applicable

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