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IP Indian Journal of Neurosciences

Journal homepage: <https://www.ijonline.org/>

Case Report

Neuroleptic malignant syndrome susceptibility during extreme heat waves: A case report on a patient with schizophrenia

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ARTICLE INFO

Article history:

Received 30-05-2023

Accepted 05-07-2023

Available online 28-07-2023

Keywords:

Neuroleptic malignant syndrome (NMS)

Heat waves

Antipsychotics

ABSTRACT

This case report presents the clinical course of a 33-year-old male with a long-standing history of schizophrenia who presented to the psychiatric outpatient department. The patient exhibited symptoms including fever, confusion, rigidity, slurred speech, and generalized body swelling, prompting immediate admission for thorough evaluation and management. In response to the high fever and unclear etiology, our investigation broadened to consider the possible influence of heat wave exposure. The medical team took a comprehensive approach, suspending all current antipsychotic medications and implementing treatment modifications, fluid therapy, and symptomatic relief measures. The patient's condition improved significantly, leading to discharge after a nine-day hospitalization with a well-structured follow-up plan. This case highlights the importance of considering exposure to heat waves that can potentially increase susceptibility to adverse reactions to medications, including antipsychotics, thereby potentially elevating the risk of developing neuroleptic malignant syndrome (NMS) and also shows further need to explore the relationship between heat waves, antipsychotic medication, and the development of neuroleptic malignant syndrome.

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1. Introduction

Neuroleptic Malignant Syndrome (NMS) is a rare but potentially life-threatening condition that can occur as a side effect of certain medications, particularly antipsychotic drugs. NMS is characterized by a collection of symptoms that affect the central nervous system and the autonomic nervous system. The exact cause of NMS is not fully understood, but it is believed to result from an abnormal reaction to dopamine medications that disrupt the balance of neurotransmitters in the brain. Some factors that may increase the risk of developing NMS include high doses of antipsychotic medications, rapid dose increases, and the use of certain medications such as first-generation antipsychotics. Symptoms of NMS usually develop within

days to weeks after starting or increasing the dosage of the medication. The most common symptoms include: Hyperthermia (high fever), Muscle rigidity, Altered mental status (confusion, agitation), autonomic dysfunction (fluctuations in blood pressure, tachycardia, sweating), Tremors or muscle tremors, Dysphagia (difficulty swallowing), Elevated creatine kinase (a marker of muscle breakdown). Treatment of NMS typically involves discontinuing the causative medication and supportive care. Hospitalization is often necessary to monitor vital signs, manage hydration, and provide symptomatic relief. Medications such as muscle relaxants, benzodiazepines, and dopamine agonists may be used to manage symptoms. In severe cases, intensive care management may be required. CNS infections, mass lesions, deadly catatonia, severe extrapyramidal reactions, anti-cholinergic or lithium toxic, heat stroke, and malignant hyperthermia are possible

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diagnoses.¹

While Neuroleptic Malignant Syndrome (NMS) is typically associated with the use of antipsychotic medications, it is important to note that heat waves can also pose significant health risks, including the potential for developing NMS-like symptoms. Heat-related illnesses, such as heat exhaustion or heatstroke, can share similarities with NMS symptoms due to the body's response to extreme heat. During heat waves, especially in hot and humid environments, the body's ability to regulate temperature can be overwhelmed, leading to heat-related conditions. Symptoms of heat-related illnesses can include: High body temperature: Heatstroke, in particular, is characterized by a body temperature of 104°F (40°C) or higher, altered mental status: Confusion, disorientation, agitation, or even loss of consciousness, rapid heart rate (The heart may beat faster to try to cool the body), sweating or lack of sweating (Heat exhaustion may cause profuse sweating, while heatstroke can lead to a lack of sweating), muscle cramps (Painful muscle contractions can occur, especially in the legs or abdomen), nausea and vomiting (Gastrointestinal symptoms may accompany heat-related illnesses). Dehydration due to heat waves can contribute to various health complications, including heat-related illnesses, which can share some symptoms with NMS. When the body loses more fluids than it takes in, dehydration can occur. Prolonged or severe dehydration can lead to electrolyte imbalances and affect the body's ability to regulate temperature and function properly. In hot environments or during physical exertion, inadequate fluid intake and excessive sweating can increase the risk of dehydration and heat-related conditions.

2. Case Presentation

In June 2023, a 33-year-old male presented to the Psychiatric OPD, Institute of Medical Sciences, BHU with a history of Schizophrenia and a 14-year-long medication regimen. He reported experiencing several distressing symptoms over the past two days, including high-grade fever, confusion, rigidity in both upper and lower limbs, slurred speech, and generalized body swelling. The patient also mentioned being exposed to heat waves recently. Recognizing the severity of his condition, he was promptly admitted to the Psychiatric IPD for further evaluation and management. Upon admission, the medical team initiated treatment to address the patient's symptoms. Considering his existing medications and condition, a comprehensive approach was adopted. The patient had been prescribed Tab. Risperidone (4mg), Tab. Olanzapine (5mg), Trihexyphenidyl, and Tab. Divalproex (300mg) by a private psychiatrist for the past five months. The administration of all current antipsychotic medications was suspended. The medical team administered Phenergan (10mg) to alleviate the patient's symptoms of fever, confusion, and swelling. To manage hypertension and regulate his blood pressure,

the patient was prescribed T. Bromocriptine (2.5mg) and Tab LR (21mg). These medications were crucial in stabilizing his vital signs and ensuring his overall well-being. The patient's fever persisted within the range of 100-107°F, indicating a significant inflammatory response. To combat dehydration and maintain electrolyte balance, oral fluid ORS (1 pack in 1L water) was introduced into his treatment regimen. This helped to restore his fluid levels and improve his overall hydration status. To provide relief from physical discomfort and swelling, the medical team prescribed Thrombophob gel. This topical gel was applied to alleviate the rigidity and swelling experienced in the patient's limbs, enhancing his comfort and mobility. Throughout his hospitalization, the patient received appropriate pharmacotherapy and intravenous fluids to address his symptoms effectively. After nine days of comprehensive care, his vegetative functions returned to normal, and his symptoms significantly improved. With his condition stabilized, the patient was discharged from the hospital with a follow-up plan in place to ensure his continued progress and well-being. The multidisciplinary approach employed by the medical team, encompassing psychiatric management, symptomatic treatment, fluid therapy, and supportive care, played a vital role in the patient's recovery.

3. Discussion

Neuroleptic malignant syndrome (NMS) is an infrequent but potentially life-threatening adverse reaction that is primarily associated with the use of first-generation antipsychotic medications.² Neuroleptic malignant syndrome (NMS) is a relatively rare but potentially life-threatening condition that is often overlooked in patients presenting with fever.³ Heat stroke frequently presents with fever and altered level of consciousness, but it can be distinguished by its abrupt onset and more frequent presence of parched skin, hypotension, and limb flaccidity than extrapyramidal signs.⁴ In this case upon encountering a patient with high fever and an unclear cause, our investigative efforts widened to include exposure to heat waves as a potential factor. Delving into the patient's psychiatric history and medication regimen, a noteworthy observation emerged: the individual was concurrently taking multiple antipsychotic medications but High-potency, first-generation antipsychotics, such as haloperidol, have been commonly associated with the development of neuroleptic malignant syndrome.² In the case of the current patient, it is worth noting that he was taking risperidone and olanzapine for overtime period of 5 months, which are both second-generation and atypical antipsychotic medications. These medications primarily target dopamine and serotonin receptors in the brain, offering a broader receptor profile compared to first-generation antipsychotics. Second-generation antipsychotics like risperidone and olanzapine

are known to have a reduced risk of extrapyramidal symptoms and are associated with a potentially lower incidence of certain side effects, such as movement disorders. Therefore, in the current patient's case, we expanded our differential diagnosis to include exposure to heat waves as a possible contributing factor to his symptoms.

Patient is likely to have his symptoms exacerbated by dehydration resulting from fluid depletion due to inadequate oral intake, compounded by the rising temperatures experienced in the region during the summer season. In a review it was observed that seven out of 39 patients with neuroleptic malignant syndrome were found to be dehydrated.⁵ However, determining whether dehydration was a secondary effect or one of the triggering factors remains challenging. The current patient exhibited significant symptoms, including an extremely high fever of 107 degrees Fahrenheit and rigidity in both upper and lower limbs. Given the prevailing hot temperatures in the city, ranging from 35 to 40 degrees Celsius, there is a possibility of a correlation between heat strokes and cases of Neuroleptic Malignant Syndrome (NMS). Neuroleptic malignant syndrome has been observed in patients who had previously received the same drug without complications, as well as in those who were safely administered the drug again immediately after experiencing the syndrome. Hence, the development of the syndrome appears to be influenced by the simultaneous presence of multiple factors.^{6,7}

Heat stroke can lead to various physiological changes and complications, including disruption of the central nervous system. In this compromised state, individuals may be more susceptible to developing adverse reactions to medications, including antipsychotics, which could increase the risk of NMS. In this case, the patient presented with very high fever, rigidity in limbs, and possible fluid depletion. These symptoms align more closely with NMS rather than heat stroke. However, considering the extreme hot temperatures in the city, heat stroke may be a reason as well, particularly with the history of patient being exposed to high temperatures.

4. Statement of Informed Consent and Ethical Approval

The authors confirm that they have obtained all necessary patient consent forms.

5. Conflicting of Interests

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

6. Source of Funding

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


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Cite this article: Yadav JS, Dixit S, Rajshree V, Kalra A. Neuroleptic malignant syndrome susceptibility during extreme heat waves: A case report on a patient with schizophrenia. *IP Indian J Neurosci* 2023;9(2):93-95.