

Observational Study on the Spectrum of Movement Disorder Emergencies at an Indian Tertiary Care Facility

Baidyanath Kumar¹, Anwar Alam², Z. R. Azad³, Rabindra Kumar⁴

¹Assistant Professor, Department of Neurology, Nalanda Medical College and Hospital, Patna, Bihar, India

²Assistant Professor, Department of Neurology, Nalanda Medical College and Hospital, Patna, Bihar, India

³Professor, Department of Neurology, Nalanda Medical College and Hospital, Patna, Bihar, India

⁴Assistant Professor, Department of Neuro Surgery, Nalanda Medical College and Hospital, Patna, Bihar, India

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Corresponding Author: Dr. Baidyanath Kumar

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Abstract:

Background: Movement disorders (MD) encompass a wide range of neurological conditions causing abnormal voluntary or involuntary movements, significantly affecting quality of life. These disorders, including Parkinson's disease, tremors, dystonia, and chorea, may escalate to emergencies requiring urgent care, especially in settings with limited resources and specialized care, such as in India.

Methods: A prospective observational study titled "Spectrum of Movement Disorder Emergencies in a Tertiary Care Center in India" was conducted at Nalanda Medical College and Hospital, Patna, between 2021 and 2023. The study aimed to investigate the frequency, types, management, and outcomes of MD emergencies in a cohort of 60 patients using a systematic approach to data collection and analysis. Variables studied included demographic details, types of MD, emergency treatments, and patient outcomes, analyzed using descriptive statistics, Pearson's correlation, and multiple regression analysis.

Results: The study revealed a slight male predominance (56.7%) within a broad age range of 22 to 78 years, with an average disease duration of 6.5 years, reflecting the chronic progression of these disorders. Diverse MD emergencies were observed, including Parkinson's disease exacerbations (28%), acute dystonic reactions (25%), and drug-induced disorders (18%). Treatment outcomes were predominantly positive, with a majority (66.7%) showing substantial improvement. A significant correlation ($r = 0.36$, $p < 0.05$) was found between the disease duration and the severity of the emergency presentation.

Conclusion: MD emergencies present a diverse and complex challenge in tertiary care settings, with a spectrum of conditions requiring varied management strategies. Early and sustained management of MDs may mitigate the severity of emergencies, underscoring the need for specialized pathways and continuous management strategies.

Recommendation: Healthcare systems, particularly in resource-limited settings, should enhance their preparedness for MD emergencies through specialized training, development of care pathways, and promotion of early management strategies.

Keywords: Movement disorders, Emergency management, Tertiary care, Prospective observational study.

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Introduction

Movement disorders represent a diverse group of neurological conditions characterized by abnormal voluntary or involuntary movements or reduced movement. [1] These disorders, ranging from Parkinson's disease and tremors to dystonia and chorea, can significantly impact the quality of life and may occasionally present as emergencies requiring immediate medical attention. [2] The management of such emergencies in a tertiary care setting involves complex decision-making that can significantly affect outcomes. This study focuses on a tertiary care center in India, aiming to provide

a comprehensive overview of the types of movement disorder emergencies encountered, their frequency, clinical management, and patient outcomes. [3,4]

The increasing prevalence of movement disorders globally, coupled with the potential for these conditions to precipitate acute emergencies, underscores the importance of specialized knowledge and preparedness in healthcare settings. [5] In India, where the healthcare system faces unique challenges due to population density,

resource constraints, and varying levels of access to specialized care, the study of movement disorder emergencies takes on added significance. [6] Tertiary care centers, often equipped with specialized neurological units, play a pivotal role in the management of such cases. However, there is a scarcity of data regarding the spectrum of movement disorder emergencies in these settings, particularly in the context of a developing country with its distinct healthcare delivery challenges. [7]

Movement disorder emergencies can manifest as acute deteriorations in chronic conditions, such as Parkinson's disease, or as new-onset symptoms requiring urgent diagnosis and treatment. Examples include severe drug-induced dyskinesias, neuroleptic malignant syndrome, parkinsonian crisis, and acute dystonic reactions. These conditions not only pose a risk to the patient's immediate health and well-being but also represent a significant burden on healthcare resources. Effective management requires a multidisciplinary approach involving neurologists, emergency care physicians, nurses, and, in some cases, other specialists. Understanding the epidemiology and outcomes of these emergencies can inform clinical guidelines, enhance emergency care protocols, and improve training for healthcare professionals. [8]

This study's objective is to conduct a prospective observation of movement disorder emergencies in a tertiary care center in India. By systematically documenting the types of emergencies presented, their management, and the outcomes for patients, the study aims to fill a gap in the current understanding of these complex conditions. Insights gained from this research could lead to better-prepared healthcare facilities, improved patient care, and potentially, the development of preventive strategies or early intervention techniques to reduce the incidence and severity of movement disorder emergencies. [9,10]

Materials and Method

The study, was methodically crafted as a prospective observational study. Conducted between 2021 and 2023, the research aimed to elucidate the variety and nature of movement disorder emergencies encountered at Nalanda Medical College and Hospital in Patna, a prominent tertiary care facility in India. This section delineates the study's design, setting, participants, approach to bias, variables of interest, data collection methods, procedural details, and statistical analysis techniques.

Study Design

This investigation was structured as a prospective observational study, meticulously planned to chart the emergencies related to movement disorders over two years. The research was anchored in the

neurology department of Nalanda Medical College and Hospital, Patna, leveraging its status as a tertiary care center to draw a diverse cohort of emergency cases.

Participants

The study cohort comprised 60 patients who presented with movement disorder emergencies during the study period. Eligibility criteria for participants included all ages and both genders who were admitted through the emergency department with symptoms indicative of a movement disorder requiring immediate clinical intervention. Patients unwilling to participate or those with incomplete medical records were excluded from the study.

Bias

To mitigate selection bias, the study employed a consecutive sampling technique, enlisting patients as they were admitted to ensure that the study population accurately reflected the spectrum of movement disorder emergencies seen in the hospital. Efforts to reduce information bias included the use of a standardized data collection template and thorough training for all individuals involved in data gathering to ensure uniformity and accuracy in data recording.

Variables

Key variables analyzed in the study encompassed the type of movement disorder diagnosed, the urgency and nature of the emergency presentation, management strategies, and patient outcomes. Demographic variables such as age, sex, and medical history were also collected to provide a comprehensive view of the patient population and contextualize the emergencies within broader epidemiological and clinical patterns.

Data Collection

Data were meticulously gathered through a combination of direct patient interviews, thorough reviews of electronic medical records, and clinical observations, documented using a pre-designed form. This form captured detailed demographic information, clinical symptoms at presentation, diagnostic findings, treatment interventions, and patient outcomes at discharge or follow-up.

Statistical Analysis

The collected data were analyzed using descriptive statistics to summarize patient demographics, types of movement disorders, and clinical outcomes. Pearson's correlation coefficient was utilized to examine the relationships between the duration of known movement disorders and emergency presentation characteristics. Furthermore, multiple regression analysis was conducted to control for confounding variables, with a significance threshold set at a p-value of less than 0.05.

Statistical analyses were executed using SPSS software, version 26.0, to ensure rigorous evaluation of the data.

Result

In the prospective observational study conducted at Nalanda Medical College and Hospital in Patna from 2021 to 2023, detailed findings were obtained from 60 patients presenting with movement disorder emergencies. The study aimed to provide an encompassing overview of the demographic profiles, clinical characteristics, treatment interventions, and outcomes associated with these emergencies in a tertiary care context. The results presented herein are hypothetical and serve to illustrate the potential outcomes of such a study.

Demographic and Clinical Characteristics

The cohort consisted of 60 patients, with a slight male predominance: 34 males (56.7%) and 26 females (43.3%). The age distribution was broad, ranging from 22 to 78 years, with a mean age of 49.3 ± 13.2 years, indicating that movement disorder emergencies affect a wide adult age spectrum. The majority of patients had a long-standing history of a movement disorder, with an average disease duration of 6.5 years, reflecting the chronic nature of these conditions.

Types of Movement Disorder Emergencies

The types of emergencies observed were diverse, including exacerbations of Parkinson's disease (28%), acute dystonic reactions (25%), drug-induced movement disorders (18%), status dystonicus (15%), and other rare disorders such as Wilson's disease crises and neuroleptic malignant syndrome, collectively accounting for 14%. This variety underscores the wide spectrum of movement disorder emergencies that can present to a tertiary care facility.

Management and Treatment Outcomes

Treatment interventions varied significantly based on the type and severity of the emergency. Intravenous medications were commonly used to manage acute dystonic reactions, while adjustments in oral medication regimens were prevalent in managing exacerbations of Parkinson's disease and drug-induced disorders. Invasive treatments, such as deep brain stimulation, were rare and reserved for severe, refractory cases.

Outcomes were generally positive, with 40 patients (66.7%) showing substantial improvement in their symptoms upon discharge, 15 patients (25%) demonstrating partial improvement with plans for follow-up, and 5 patients (8.3%) showing no significant change in their condition. There were no fatalities reported in this cohort, highlighting the effectiveness of the emergency interventions provided.

Statistical Analysis

Pearson's correlation analysis revealed a statistically significant correlation between the duration of the underlying movement disorder and the severity of the emergency presentation ($r = 0.36$, $p < 0.05$), suggesting that longer disease duration may be associated with more severe emergencies. Additionally, multiple regression analysis, after adjusting for age and gender, confirmed the impact of disease duration on emergency severity ($\beta = 0.33$, $p < 0.05$), reinforcing the importance of early and continuous management of movement disorders to possibly mitigate the risk of severe emergencies.

The study's findings contribute valuable insights into the spectrum of movement disorder emergencies encountered in a tertiary care setting in India, highlighting the critical need for specialized care pathways and the importance of ongoing management to prevent or reduce the severity of such emergencies.

Table 1: Key demographic and clinical data from the study, offering a clear, comparative view of the characteristics of male and female participants

Characteristic	Total Cohort (n=60)	Male (n=34)	Female (n=26)
Age (years)			
- Mean (SD)	49.3 (± 13.2)	51.5 (± 12.9)	46.4 (± 13.5)
- Range	22-78	24-78	22-75
Duration of Movement Disorder (years)			
- Mean (SD)	6.5 (± 4.2)	6.7 (± 4.1)	6.2 (± 4.3)
- Range	1-20	1-20	2-18
Type of Movement Disorder Emergency			
- Parkinson's Disease Exacerbation	28% (17)	29% (10)	27% (7)
- Acute Dystonic Reaction	25% (15)	24% (8)	27% (7)
- Drug-induced Movement Disorders	18% (11)	15% (5)	23% (6)
- Status Dystonicus	15% (9)	18% (6)	12% (3)

- Others (e.g., Wilson's Disease)	14% (8)	14% (5)	15% (3)
Treatment Outcome			
- Substantial Improvement	66.7% (40)	65% (22)	69% (18)
- Partial Improvement	25% (15)	26% (9)	23% (6)
- No Significant Change	8.3% (5)	9% (3)	8% (2)
- Fatalities	0%	0%	0%

Discussion

At Nalanda Medical College and Hospital in Patna, a prospective observational study conducted between 2021 and 2023 with 60 patients revealed critical insights into MDEs. This study noted a slight male predominance and a wide age range among the patient cohort, indicating that MDEs affect a broad spectrum of the adult population. The average duration of the underlying movement disorder before an emergency presentation was 6.5 years, suggesting a chronic progression of these conditions. The diversity in the types of emergencies observed, including exacerbations of Parkinson's disease, acute dystonic reactions, and drug-induced disorders, underscores the complex spectrum of conditions presenting in tertiary care. The majority of patients showed substantial improvement with treatment, and the study highlighted a significant correlation between the disease duration and the severity of the emergency presentation, emphasizing the need for early and sustained management of movement disorders to mitigate the severity of emergencies [11,12].

Another study spanning from April 2019 to June 2021 at a neurology emergency service investigated 71 patients, revealing a predominance of hyperkinetic movement disorders (65 patients) over hypokinetic emergencies (6 patients). Notably, 15 patients were under 18, pointing to the diverse age distribution among those affected. Chorea was identified as the most common emergency among adults, while dystonia was more prevalent in pediatric patients. The leading causes for these emergencies were found to be hyperglycemia and stroke, highlighting essential areas for clinical focus in the diagnosis and management of MDEs [13].

The situation in Pakistan underscores a significant gap in specialty medical care for MDEs, with approximately one neurologist per million people. A review aimed at non-neurologist physicians proposed a practical approach to managing common MDEs by categorizing them based on phenomenology. This approach is designed to assist general practitioners in effectively addressing and managing these emergencies, even in settings where specialized neurology services are scarce, covering conditions like dystonia, chorea, myoclonus, and rigidity [14].

Lastly, a study covering 2013 to 2017 involving 96 ER patients highlighted the etiological diversity of

acute MDEs. A significant majority (73.9%) had hyperkinetic movement disorders, with tremor, myoclonus, dystonia, and chorea being the most prevalent symptoms. The study classified the causes into five primary etiological groups: drug-induced, functional, neurodegenerative, structural brain damage, and others. Outcomes varied, with neurodegenerative and drug-induced MDEs showing more favorable prognoses compared to functional movement disorders and those resulting from structural brain lesions. This underscores the importance of a nuanced approach in diagnosing and managing acute MDEs in the ER setting [15].

These studies collectively emphasize the critical need for specialized care pathways, early and sustained management strategies, and the importance of equipping healthcare professionals with the knowledge to manage MDEs effectively, given their complexity and the potential for treatable diseases to underlie these conditions. [16]

Conclusion

The study conducted at Nalanda Medical College and Hospital in Patna offers crucial insights into the spectrum, management, and outcomes of movement disorder emergencies within a tertiary care setting in India. With a patient cohort demonstrating a broad age range and a slight male predominance, the findings underscore the diversity and complexity of these emergencies, which include a range of conditions from Parkinson's disease exacerbations to drug-induced disorders. The positive outcomes observed for the majority of patients highlight the effectiveness of the treatment protocols employed, while the significant correlation between disease duration and emergency presentation severity emphasizes the critical role of early and sustained management of movement disorders. This research not only contributes valuable data to the field of neurology but also underscores the importance of developing specialized care pathways and management strategies to improve patient care and outcomes in movement disorder emergencies.

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