



Stereotypy with Parkinsonism as a Rare Sequelae of Dengue Encephalitis: A Case Report and Literature Review

V. H. GANARAJA

NITISH KAMBLE

M. NETRAVATHI

VIKRAM V. HOLLA

NEERAJA KOTI

PRAMOD KUMAR PAL

**Author affiliations can be found in the back matter of this article*

CASE REPORT

]u[ubiquity press

ABSTRACT

Background: Parkinsonism following viral encephalitis is well reported. However, in addition, to parkinsonism other movement disorders such as dystonia, chorea, myoclonus may also be observed in these patients. Stereotypy is a very rare manifestation following viral encephalitis.

Case report: Here we report a rare case of a 25-year-old young man who developed stereotypy and parkinsonism following dengue virus encephalitis. The stereotypy was in the form of snapping of fingers of left-hand which was repetitive, purposeless, non-goal directed, present for most of the day and partially suppressible.

Discussion: This report expands the spectrum of movement disorders seen in dengue infection.

CORRESPONDING AUTHOR:

Dr. Pramod Kumar Pal

Professor, Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

palpramod@hotmail.com

KEYWORDS:

Dengue encephalitis; Encephalitic sequelae; Parkinsonism; Snapping movements; Stereotypy; Viral encephalitis

TO CITE THIS ARTICLE:

Ganaraja VH, Kamble N, Netravathi M, Holla VV, Koti N, Pal PK. Stereotypy with Parkinsonism as a Rare Sequelae of Dengue Encephalitis: A Case Report and Literature Review. *Tremor and Other Hyperkinetic Movements*. 2021; 11(1): 22, pp. 1-7. DOI: <https://doi.org/10.5334/tohm.630>

INTRODUCTION

Post encephalitic parkinsonism was initially described following an influenza pandemic in 1917 which was later infrequently reported [1]. Stereotypy has been described before as a part of various neurodegenerative disorders such as Rett syndrome, neuroacanthocytosis and also in autoimmune disorders such as PANDAS. However, stereotypy following dengue virus encephalitis has not been reported till date. Here we describe a rare case of stereotypy with parkinsonism following dengue virus encephalitis. The patient and his guardians have provided a written informed consent for publishing the clinical details including the video.

CASE REPORT

About 4 months back, a 25-year-old young man had high-grade fever, headache and vomiting for 5 days and later developed altered sensorium. He was admitted in the intensive care unit of a nearby hospital for 10 days. Investigations revealed a positive dengue NS1 antigen test. He was treated symptomatically and over the next 15 days, the sensorium gradually improved. During the recovery phase, the patient was found to have dysarthria and reduced speech output. Two months following encephalitis, he developed slowness while walking and a feeling of stiffness in both lower limbs. He required one-person support to walk and had toe walking with bent knees. In addition, he developed snapping of fingers of left-hand which was repetitive, purposeless and non-goal directed. It was present for most of the day and was partially suppressible. There was no feeling of discomfort or urge to perform these movements on voluntary suppression. It was sometimes associated with tremulousness of left index finger. The patient was aware of the symptoms but could not control them completely. These movements would subside during sleep. There was no progression in the severity of these snapping movements till the time he presented to us.

He was born to a non-consanguineous parentage with normal birth and developmental history. There was no history of neurological illness, movement disorders (dystonia/parkinsonism) or psychiatric illness in the family. There was no history of psychiatric illness in the past and he was never treated with dopamine blockers or other medications. There was no history of alcohol or substance abuse. Our patient hails from north Karnataka state in the southern part of India which is endemic for dengue. He was working in a grocery shop and there was no history of exposure to alcohol or chemicals/solvents.

On examination, the patient was conscious, alert and responsive to commands. His vital parameters were within normal limits. On neurological examination, he had mild up-gaze restriction along with jerky pursuits and normal saccades. He also had reduced facial expression. His speech was severely hypophonic with palilalia. Examination of other cranial nerves was normal. Paratonia was observed in both the upper limbs and spasticity in lower limbs. There was a mild head flexion to left with dystonic posturing of right hand. Hand grip of both sides were normal. Lower limb movements were restricted due to spasticity; however, he was able to lift against gravity. All deep tendon reflexes were brisk with bilateral extensor plantar responses. Sensory examination was normal.

He had repetitive, coordinated and patterned snapping movements involving the left thumb and middle finger which were partially suppressible. In addition, there was slow and coarse tremor of the left index finger (**Video segment 1**). Generalized bradykinesia was present along with micrographia. He had a stooped posture with knees flexed, severe freezing of gait and needed one-person support to walk, (**Video segment 2**). Other systemic examinations were unremarkable.

His routine blood investigations- complete hemogram, liver and kidney function tests were normal. Serum IgM antibodies against dengue virus were detected. Antibodies against chikungunya and Japanese encephalitis infections were negative. Screening for HIV, Hepatitis B, hepatitis C and valuations for autoimmune encephalitis were negative. Serum copper/ceruloplasmin were within normal limits. CSF was acellular and normal protein and glucose. Ultrasound abdomen was normal. Brain MRI showed atrophy with



Video Video segment 1: Stereotypy involving left thumb and middle finger. Video segment 2: Bradykinesia with gait freezing and stooped posture.

Segment 1 Involuntary, patterned and coordinated snapping movements observed involving left thumb and middle finger which is partially suppressible.

Segment 2 Bradykinesia involving upper and lower limbs along with snapping movements in left hand as described and severe gait freezing.

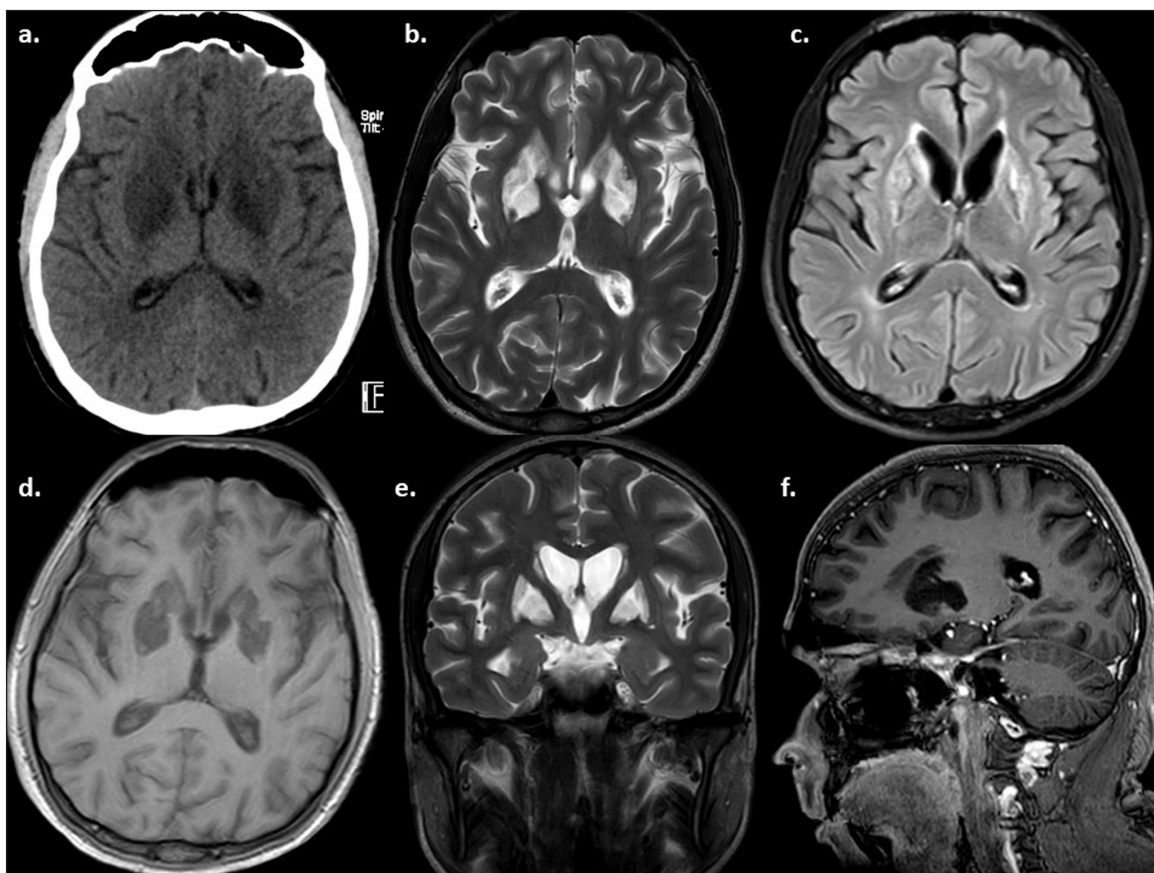


Figure 1 CT brain axial (a) showing hypo density in bilateral basal ganglia and MRI findings (b)-T2 Axial, (c)-FLAIR Axial, (d)-T1 Axial, (e)-T2 coronal sequences showing bilateral basal ganglia involvement. (f)-T1 coronal at the level of basal ganglia without any contrast enhancement.

bilateral basal ganglia T2/FLAIR hyperintensities without any contrast enhancement (**Figure 1**). He was treated symptomatically with combination of levodopa-carbidopa (400 mg/day), baclofen (30 mg/day), pramipexole (0.75 mg/day), amantadine (100 mg/day), tolperisone (50 mg/day) and diazepam (6 mg/day). In addition, the patient also underwent physiotherapy, neurorehabilitation and speech therapy. There was minimal improvement in parkinsonism symptoms with no improvement in stereotypy.

DISCUSSION

Here we report a combination of stereotypy and parkinsonism which is an unusual complication of dengue encephalitis. Stereotypy is an involuntary, coordinated, patterned repetitive, rhythmic and purposeless movement [2]. Commonly stereotypies are seen as arm flapping, finger wiggling, head nodding and body rocking, often associated with neurodegenerative conditions such as Rett syndrome, neuroacanthocytosis and sometimes even in normal individuals. Secondary stereotypies following

encephalitis are very rare. Face scratching stereotypy has been described in herpetic encephalitis [3] and nose pinching in seronegative autoimmune encephalitis [4]. Rapid tremor like stereotyped movements involving right hand and foot is also reported in anti-basal ganglia antibody disease [5]. However stereotypic snapping movements of hand as a sequelae of dengue encephalitis have not been described till date. Our patient also had parkinsonism in addition to stereotypy. Though first description of delayed parkinsonism following encephalitis was in 1918 by Von Economo related to influenza pandemic [6], parkinsonism as a sequelae to dengue encephalitis was described very recently [7].

There are only a handful of reports of various movement disorders following dengue encephalitis, common being parkinsonism, ataxia and opsoclonus-myoclonus syndrome (**Table 1**). The pathophysiology of these movement disorders following encephalitis is not well understood. Neurotropic mechanism, systemic complication and immune mediated damage have been hypothesized to cause neurological manifestations [8]. Extrapyramidal manifestations in viral encephalitis have been postulated to be due to involvement of basal ganglia, mainly substantia nigra by

S.NO.	STUDY AND YEAR	COUNTRY	AGE	GENDER	MOVEMENT DISORDERS	BRAIN MRI	DENGUE IGM ANTI-BODY(SERUM)	DENGUE IGG ANTI-BODY(SERUM)	DENGUE NS1 ANTIGEN	DENGUE IGM ANTI-BODY(CSF)	REFERENCE NO
1	Matta et al.2004	Brazil	10Yrs	Female	Diminished level of consciousness, spastic tetra paresis, cerebellar syndrome and frontal symptoms	Cerebral peduncle, lentiform nuclei and internal capsule signal changes on both sides	Diagnosis was made by ELISA	NA	NA	NA	[14]
2	Verma et al. 2011	India	34Yrs	Female	Opsoclonus Myoclonus Syndrome	Normal	Positive	NA	NA	NA	[15]
			19Yrs	Female	Opsoclonus Myoclonus Syndrome	Normal	positive	NA	NA	NA	
3	Karunaratne et al. 2012	Sri Lanka	43Yrs	Male	Ataxia	Hyperintensity in bilateral cerebellar hemisphere spreading across vermis	Positive for Dengue and EBV	Positive	NA	NA	[16]
4	Azmin et al. 2013	Malaysia	18Yrs	Male	Parkinsonism with multiple cranial neuropathy with cerebellar ataxia and brachial plexopathy	Normal	Positive	Positive	Positive	NA	[7]
5	Withana et al. 2014	Sri Lanka	45Yrs	Female	Ataxia	Normal	Positive	Positive	Positive	NA	[17]
6	Fong et al. 2014	Malaysia	6Yrs	Female	Parkinsonism	Normal	Positive	NA	Positive	NA	[18]
7	Weeratunga et al. 2014	Sri Lanka	40Yrs	Female	Ataxia	Normal	Positive	NA	NA	Positive	[19]
			28Yrs	Male	Ataxia	Normal	Positive	NA	NA	Positive	
			25Yrs	Male	Ataxia	Bilateral and symmetrical T2 hyper intense lesions in the cerebellum	Positive	NA	NA	Positive	
8	Tan et al 2014	Malaysia	30Yrs	Male	Opsoclonus Myoclonus Syndrome	Pachy- and leptomenigeal enhancement.	Positive	Positive	NA	NA	[20]
			10Yrs	Male	Opsoclonus Myoclonus Syndrome	NA	Positive	NA	positive	NA	
9	Patel et al. 2017	India	16Yrs	Male	Ataxia	Signal intensity alteration in pons, medulla, superior, and middle cerebellar peduncles with patchy enhancement.	Positive	NA	NA	NA	[21]

(Contd.)

S.NO.	STUDY AND YEAR	COUNTRY	AGE	GENDER	MOVEMENT DISORDERS	BRAIN MRI	DENGUE IGM ANTI-BODY(SERUM)	DENGUE IGG ANTI-BODY(SERUM)	DENGUE NS1 ANTIGEN	DENGUE IGM ANTI-BODY(CSF)	REFERENCE NO
10	Bopeththa et al. 2017	Sri Lanka	69Yrs	Male	Parkinsonism	Normal	Positive	Negative	Negative	Positive	[22]
11	Khoo et al. 2018	Malaysia	60Yrs	Male	Ataxia	Hyperintense signals at the right corona radiata and left frontal lobe(in keeping with old stroke).	Positive	NA	NA	NA	[23]
12	Desai et al. 2018	India	14Yrs	Male	Opsoclonus myoclonus	Normal	Positive	Positive	Positive	NA	[8]
13	Manapalli et al. 2019	India	48Yrs	Male	Parkinsonism	Micro infarcts in the basal ganglia	Positive	NA	Positive	NA	[12]
14	Panda et al. 2020	India	13Yrs	Male	Parkinsonism	Normal	NA	NA	Positive	NA	[24]
15	Dudipala et al. 2020	India	11Yrs	Female	Myoclonus	Normal	Positive	NA	NA	NA	[25]
16	Mishra et al. 2020	India	18Yrs	Female	Generalized dystonia/ Parkinsonism	Double Doughnut sign	NA	NA	Positive	NA	[26]
17	Current study	India	25 Yrs	Male	Stereotypy with parkinsonism	Bilateral basal ganglia T2/FLAIR hyper intensities	Positive	NA	Positive	NA	

Table 1 Reports of various movement disorders following dengue encephalitis. Abbreviations: NA-Not Available, Yrs-Years.

neurotropic viruses [9]. Cellular changes leading to basal ganglia destruction is due to formation of Lewy bodies and cell death in nigral region [10]. However, in encephalitis, inflammation effecting dopamine neurotransmission has been postulated to be one of the mechanisms for these movement disorders [11]. Inability to identify dengue virus in all the reported cases further strengthens the immune hypothesis as a mechanism for dengue encephalitis sequela in these patients. Post viral parkinsonism is usually refractory to anti-parkinsonian medications but may respond to immunosuppressants such as steroids, which again favor the role of immune mechanisms in this spectrum of disorders [12].

In our case, the presence of fever with acute signs of cerebral involvement and presence of IgM dengue antibodies in serum, which can persist up to 3 months after febrile phase, meets the criteria for dengue encephalitis [13]. We also ruled out other causes of encephalitis by appropriate investigations. This report expands the spectrum of movement disorders seen in dengue infection and is the first report of stereotypy-parkinsonism following dengue virus.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR AFFILIATIONS

V. H. Ganaraja  orcid.org/0000-0001-9726-6435

Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

Nitish Kamble  orcid.org/0000-0002-7933-8826

Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

M. Netravathi  orcid.org/0000-0002-8899-8578

Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

Vikram V. Holla  orcid.org/0000-0002-3634-2219

Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

Neeraja Koti  orcid.org/0000-0003-2582-5845

Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

Pramod Kumar Pal  orcid.org/0000-0002-4085-2377

Department of Neurology, National Institute of Mental Health and Neuro Sciences (NIMHANS), Hosur Road, Bangalore-560029, Karnataka, India

REFERENCES

- Reid AH, McCall S, Henry JM, Taubenberger JK.** Experimenting on the past: the enigma of von Economo's encephalitis lethargica. *J Neuropathol Exp Neurol.* 2001; 60: 663–670. DOI: <https://doi.org/10.1093/jnen/60.7.663>
- Kuoppamaki M, Bhatia KP, Quinn N.** Progressive delayed-onset dystonia after cerebral anoxic insult in adults. *Mov Disord.* 2002; 17: 1345–1349. DOI: <https://doi.org/10.1002/mds.10260>
- Twardowschy CA, De Paola L, Teive HAG, Silvado C.** Stereotypies After Herpetic Encephalitis with Bitemporal Lesions. *Movement Disorders.* 2010; 25(16): 2888–2898. DOI: <https://doi.org/10.1002/mds.22803>
- Garg D, Agarwal A, Bhagyawant R, Sikand TS, Singh AK.** De novo nose-pinching stereotypy with somnolence: Clues to autoimmune encephalitis. *Journal of Neuroimmunology.* 2020; 347: 577348. DOI: <https://doi.org/10.1016/j.jneuroim.2020.577348>
- Edwards MJ, Dale RC, Church AJ, Trikoui E, Quinn NP, Lees AJ, et al.** Adult-Onset Tic Disorder, Motor Stereotypies, and Behavioural Disturbance Associated With Antibasal Ganglia Antibodies. *Movement Disorders.* 2004; 19(10). DOI: <https://doi.org/10.1002/mds.20126>
- Von Economo C.** Encephalitis lethargica: Its sequelae and treatment. Translated by Newman KO. London: Oxford University Press; 1931. DOI: <https://doi.org/10.1097/00007611-193111000-00029>
- Azmin S, Sahathevan R, Suehazlyn Z, Law ZK, Rabani R, Nafisah WY, Tan HJ, Norlinah MI.** Post-dengue parkinsonism. *BMC Infect Dis.* 2013 Apr 18; 13: 179. DOI: <https://doi.org/10.1186/1471-2334-13-179>
- Desai SD, Gandhi FR, Vaishnav A.** Opsoclonus Myoclonus Syndrome: A Rare Manifestation of Dengue Infection in a Child. *J Pediatr Neurosci.* 2018 Oct–Dec; 13(4): 455–458. DOI: https://doi.org/10.4103/JPN.JPN_55_18
- Vilensky JA, Goetz CG, Gilman S.** Movement disorders associated with encephalitis lethargica: a video compilation. *Mov Disord.* 2006; 21: 1–8. DOI: <https://doi.org/10.1002/mds.20722>
- Takahashi M, Yamada T.** Viral etiology for Parkinson's disease a possible role of inf A virus infection. *Jpn J Infect Dis.* 1999; 52(3): 89–98. DOI: <https://doi.org/10.7883/yoken.52.89>
- Dale RC, Church AJ, Surtees RA, et al.** Encephalitis lethargic syndrome: 20 new cases and evidence of basal ganglia autoimmunity. *Brain.* 2004; 127(Part 1): 21–33. DOI: <https://doi.org/10.1093/brain/awh008>
- Manappallil RG.** Parkinsonism following basal ganglia infarction in Dengue fever. *Asian J Med Sci.* 2019; 10: 62–64. DOI: <https://doi.org/10.3126/ajms.v10i2.22614>
- Soares C, Puccioni-Sohler M.** Dengue encephalitis: suggestion for case definition. *J Neurol Sci.* 2011; 306: 165. DOI: <https://doi.org/10.1016/j.jns.2011.04.010>

14. **Palma-da Cunha-Matta A, Soares-Moreno SA, Cardoso-de Almeida A**, et al. Neurological complications arising from dengue virus infection. *Rev Neurol*. 2004; 39: 233–7. DOI: <https://doi.org/10.33588/rn.3903.2002540>
15. **Verma R, Sharma P, Garg RK, Atam V, Singh MK, Mehrotra HS**. Neurological complications of dengue fever: experience from a tertiary center of north India. *Ann Indian Acad Neurol*. 2011; 14: 272–78 DOI: <https://doi.org/10.4103/0972-2327.91946>
16. **Karunaratne S, Udayakumara Y, Fernando H**. Epstein-Barr virus co-infection in a patient with dengue fever presenting with post-infectious cerebellitis: a case report. *J Med Case Reports*. 2012; 6: 43. DOI: <https://doi.org/10.1186/1752-1947-6-43>
17. **Withana M, Rodrigo C, Chang T, Karunanayake P, Rajapakse S**. Dengue fever presenting with acute cerebellitis: a case report. *BMC Res Notes*. 2014 Mar 5; 7: 125. DOI: <https://doi.org/10.1186/1756-0500-7-125>
18. **Fong Choong Yi, Hlaing Chaw Su, Tay Chee Geap, Ong Lai Choo**. Post-Dengue Encephalopathy and Parkinsonism. *The Pediatric Infectious Disease Journal*. October 2014; 33(10): 1092–1094. DOI: <https://doi.org/10.1097/INF.0000000000000382>
19. **Weeratunga PN, Caldera HPMC, Gooneratne IK**, et al. Spontaneously resolving cerebellar syndrome as a sequelae of dengue viral infection: a case series from Sri Lanka. *Practical Neurology*. 2014; 14: 176–178. DOI: <https://doi.org/10.1136/practneurol-2013-000571>
20. **Tan AH, Linn K, Ramli NM, Hlaing CS, Aye AM, Sam IC**, et al. Opsoclonus-myooclonus-ataxia syndrome associated with dengue virus infection. *Parkinsonism Relat Disord*. 2014; 20: 1309–10. DOI: <https://doi.org/10.1016/j.parkreldis.2014.09.002>
21. **Patel ML, Shyam R, Pushkar DK, Sachan R**. Dengue encephalitis with cerebellar involvement: a rare case report. *Ann Trop Med Public Health*. 2017; 10: 734–6.
22. **Bopeththa BVKM, Ralapanawa U**. Post encephalitic parkinsonism following dengue viral infection. *BMC Res Notes*. 2017 Nov 29; 10(1): 655. DOI: <https://doi.org/10.1186/s13104-017-2954-5>
23. **Khoo CS**. Dengue Cerebellitis: A Case Report and Literature Review. *Am J Case Rep*. 2018 Jul 24; 19: 864–867. DOI: <https://doi.org/10.12659/AJCR.909884>
24. **Panda PK, Sharawat IK, Bolia R, Shrivasthav Y**. Dengue Virus-Triggered Parkinsonism in an Adolescent. *The American Journal of Tropical medicine and Hygiene*. 2020; 103(2): 851–854. DOI: <https://doi.org/10.4269/ajtmh.20-0039>
25. **Dudipala SC, Chaithanya KB**. Isolated Myoclonus Following Dengue Infection. *Pediatric Oncall Journal*. (April–June 2020); 17(2): 54–55. DOI: <https://doi.org/10.7199/ped.oncall.2020.25>
26. **Mishra A, Pandey S**. Generalized Dystonia/Parkinsonism and Double Doughnut Sign in Dengue Encephalitis. *Mov Disord Clin Pract*. 2020; 7: 585–586. DOI: <https://doi.org/10.1002/mdc3.12959>

TO CITE THIS ARTICLE:

Ganaraja VH, Kamble N, Netravathi M, Holla VV, Koti N, Pal PK. Stereotypy with Parkinsonism as a Rare Sequelae of Dengue Encephalitis: A Case Report and Literature Review. *Tremor and Other Hyperkinetic Movements*. 2021; 11(1): 22, pp. 1–7. DOI: <https://doi.org/10.5334/tohm.630>

Submitted: 25 April 2021 Accepted: 03 June 2021 Published: 23 June 2021

COPYRIGHT:

© 2021 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.

Tremor and Other Hyperkinetic Movements is a peer-reviewed open access journal published by Ubiquity Press.