



# WEEKLY EPIDEMIOLOGICAL REPORT

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Ministry of Health & Indigenous Medical Services

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## Possible neurological involvement of SARS-CoV-2 (COVID-19)

As of April 6<sup>th</sup>, 2020, the WHO had classified fever, tiredness, and dry cough as the most common symptoms of COVID-19, while shortness of breath, aches, and pains, sore throat were listed as other symptoms. Runny nose, nausea, and diarrhoea had been identified as rare symptoms of COVID-19. The following symptoms had been observed in 55,924 laboratory-confirmed cases: fever (87.9%), dry cough (67.7%), fatigue (38.1%), sputum production (33.4%), shortness of breath (18.6%), sore throat (13.9%), headache (13.6%), myalgia or arthralgia (14.8%), chills (11.4%), nausea or vomiting (5.0%), nasal congestion (4.8%), diarrhoea (3.7%), hemoptysis (0.9%) and conjunctival congestion (0.8%) (Aylward, Bruce (WHO); Liang, 2020). However, evidence of neurological symptoms in COVID-19 infection has been increasingly reported in the recent past.

There have been many discussions of late relating the virus to loss of sense of smell and taste in those who are infected. In a study done by King's College, London, which involved tracking of various symptoms reported by the study population, a sub-sample of 1,702 had been tested for COVID-19 and 579 out of them had tested positive for COVID. Fifty-nine percent (59%) of those who had tested positive had complained of loss of smell while only 18% of those without COVID-19 had complained of anosmia ("Loss of smell and taste a key symptom for COVID-19 cases," n.d.).

In another study that is yet to be peer-reviewed, a group of Harvard scientists had explored the

relationship between the virus and loss of smell by examining genes in the olfactory system. The results suggested that [SARS-CoV-2](#) enters a subset of olfactory epithelial cells (called sustentacular cells), which surround the neurons responsible for detecting scent (Brann et al., 2020). They suggest that this could lead to a loss of smell in the affected patient.

Loss in the sense of taste (ageusia) has also been reported in some COVID-19 patients, either together with anosmia or as a separate entity. According to the British Association of Otorhinolaryngology (ENT, UK), these two symptoms have been found in several patients and may even be the only symptoms of presentation.

In a cross-sectional survey of the prevalence of olfactory and taste disorders (OTDs), symptoms in 59 patients admitted with SARS-Cov2 to a Hospital in Milan, Italy was studied. Of them, 20 (33.9%) reported at least one taste or olfactory disorder and 11 (18.6%) reported both. Twelve patients (20.3%) presented the symptoms before the hospital admission, whereas 8 (13.5%) experienced the symptoms during the hospital stay. Taste alterations were more frequently (91%) before hospitalization, whereas after hospitalization taste and olfactory alteration appeared with equal frequency (Giacomelli et al., 2020). The head of the virology institute of University Hospital Bonn, Germany had stated that in an interview of more than 100 patients infected with COVID-19, nearly 70% had stated as having experienced a loss of smell and taste lasting several days.

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Confusion and altered mental status too have been described as possible consequences of COVID-19 infection. Acute necrotizing encephalopathy (ANE), which is also a rare complication of influenza and other viral infections, has recently been described in a patient with COVID-19 where a fifty-three-year-old female had presented with a three-day history of fever, cough and altered mental status. Radiological features had been typical of acute necrotizing encephalopathy (ANE), with bilateral thalamic lesions and other symmetric multifocal lesions in white and grey matter with haemorrhages (Poyiadji et al., 2020). This is a significant finding since altered mental status is a common finding in COVID-19 patients with acute respiratory distress, had been previously attributed to hypoxia or multi-organ failure. In a study on mice, the virus has been shown to enter the brain trans-neuronally through the olfactory pathways. There also have been reports from China of isolating the virus in the cerebrospinal fluid of a 53-year-old COVID-19 patient who had developed symptoms associated with reduced consciousness.

In a recent study published on the neurological manifestations of coronavirus disease, it was found that 78 (36.4%) out of 214 laboratory diagnosed patients had some form of neurological involvement. These manifestations had been categorized into: i) Central Nervous System manifestations which included dizziness, headache, impaired consciousness, cerebrovascular disease etc.; ii) Peripheral Nervous System manifestations which included vision/taste/ hearing impairments or neuralgia and iii) skeletal muscle injury by the virus. Out of the 78, 53 patients had CNS involvement while 19 had PNS involvement. With the exception of cerebrovascular disease and impaired consciousness, most of the neurologic manifestations occurred in the early stages of the disease (median=1-2 days) which would explain why symptoms like anosmia have been the presenting complaint of many patients. Furthermore, neurological manifestations were seen in those with more severe disease (Mao et al., 2020).

Angiotensin-Converting Enzyme-II (ACE2) has been identified as the functional receptor for coronavirus (Zhao et al., 2020). This receptor is present in many organs in the human body, including the alveolar epithelial cells of the lung, non-keratinized basal epithelial cells in the nasal and oral mucosa and the nasopharynx, vascular smooth muscle cells and in the endothelial cells of the brain (Hamming et al., 2004), which suggests that the virus may directly or indirectly infect the CNS. Furthermore, autopsy finding of COVID patients has shown that the brain tissue had been hyperemic and edematous with neuron degeneration.

Other viruses of the CoV family such as SARS-CoV and MERS

-CoV have previously been shown to cause neurological symptoms. These symptoms too point towards a possible neurological involvement during the illness and researchers are yet to determine if SARS-CoV-2 is neuro-invasive. It is also hypothesized that the severe respiratory distress seen in patients may also be a result of brainstem involvement. However, further research is needed to draw conclusive evidence on these hypotheses.

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Table 1: Selected notifiable diseases reported by Medical Officers of Health 04th- 10th April 2020 (15th Week)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningitis		Leishmaniasis		WRCD		
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**	
Colombo	10	2696	0	13	0	4	0	4	0	4	0	14	0	57	0	0	2	0	0	4	146	0	14	0	0	58	95
Gampaha	7	1604	0	3	0	0	0	4	0	4	0	19	0	37	0	1	0	0	0	0	190	0	8	0	17	51	88
Kalutara	10	931	0	5	0	4	0	3	0	3	0	1	4	101	1	8	0	1	0	7	151	0	9	0	61	82	
Kandy	2	1086	0	7	0	1	0	7	0	7	0	6	1	16	0	37	0	3	0	2	99	0	14	0	25	62	99
Matale	0	432	0	3	0	2	0	1	0	4	1	17	0	2	0	2	0	2	0	1	34	0	1	3	125	58	100
NuwaraEliya	0	129	0	11	0	0	0	0	0	0	0	15	0	40	0	2	0	2	0	1	45	0	6	0	0	23	100
Galle	1	941	0	11	0	8	0	2	0	12	0	159	0	21	0	1	0	1	0	3	187	0	15	0	2	59	80
Hambantota	0	255	0	4	0	0	0	1	0	37	0	53	0	13	0	2	0	2	0	2	102	0	8	0	231	74	90
Matarata	0	351	0	7	0	3	0	0	0	0	0	81	0	4	0	6	0	0	0	0	68	0	5	0	117	49	64
Jaffna	8	1730	2	37	0	0	0	16	0	16	0	10	0	433	0	0	0	1	2	2	68	2	6	0	0	33	93
Kilinochchi	0	104	0	19	0	0	0	3	0	0	0	6	1	18	0	0	0	0	0	0	4	0	4	0	4	67	100
Mannar	0	117	0	0	0	0	0	1	0	0	0	3	0	1	0	0	0	0	0	0	1	0	3	0	0	44	91
Vavuniya	1	229	1	5	0	0	1	4	0	0	0	30	0	1	0	0	0	0	0	6	17	0	3	0	1	62	100
Mullaitivu	0	62	0	4	0	0	0	3	0	1	0	10	0	3	0	1	0	1	0	2	0	2	0	0	5	41	76
Batticaloa	22	2005	0	38	0	2	0	0	0	4	0	13	0	0	0	0	0	1	1	1	64	0	9	0	1	61	96
Ampara	2	281	0	8	0	1	0	0	0	0	0	22	0	0	0	1	0	0	0	0	64	0	8	0	4	65	100
Trincomalee	7	2141	0	4	0	0	0	0	0	1	0	11	0	2	0	0	0	0	0	0	64	0	5	0	0	49	87
Kurunegala	1	647	0	5	0	4	0	2	0	29	0	54	0	10	0	1	0	0	0	225	0	8	0	153	56	88	
Puttalam	0	331	0	6	0	1	0	2	0	1	0	15	0	9	0	0	0	0	1	58	0	16	0	2	66	92	
Anuradhapura	2	308	0	8	0	1	0	2	0	19	1	115	0	12	0	1	0	1	1	93	0	16	0	81	55	85	
Polonnaruwa	0	182	0	4	0	0	0	0	0	0	0	55	0	0	0	12	0	0	1	69	0	8	0	87	65	97	
Badulla	1	358	0	8	0	2	0	2	0	3	2	103	2	19	0	6	0	0	1	93	0	15	0	4	59	99	
Monaragala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ratnapura	2	583	0	29	0	11	0	1	0	13	0	270	0	9	0	10	0	0	0	106	0	35	0	38	51	92	
Kegalle	3	354	0	5	0	3	0	1	0	12	0	68	0	16	0	4	0	0	1	101	0	11	0	9	60	96	
Kalmune	9	811	0	25	0	2	0	0	0	1	0	2	0	2	0	0	0	0	2	156	0	12	0	0	76	100	
<b>SRILANKA</b>	<b>88</b>	<b>18668</b>	<b>3</b>	<b>269</b>	<b>0</b>	<b>49</b>	<b>1</b>	<b>59</b>	<b>0</b>	<b>193</b>	<b>9</b>	<b>1323</b>	<b>4</b>	<b>661</b>	<b>0</b>	<b>56</b>	<b>0</b>	<b>6</b>	<b>34</b>	<b>2207</b>	<b>2</b>	<b>239</b>	<b>3</b>	<b>906</b>	<b>57</b>	<b>88</b>	

Source: Weekly Returns of Communicable Diseases (WRCD).  
 \*T=Timeliness refers to returns received on or before 10th April, 2020. Total number of reporting units 356. Number of reporting units data provided for the current week: 256. C\*\*=Completeness  
 A = Cases reported during the current week. B = Cumulative cases for the year.

**Table 2: Vaccine-Preventable Diseases & AFP**

**04th– 10th April 2020 (15th Week)**

Disease	No. of Cases by Province									Number of cases during current week in 2020	Number of cases during same week in 2019	Total number of cases to date in 2020	Total number of cases to date in 2019	Difference between the number of cases to date in 2020 & 2019
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	01	00	00	00	00	00	00	01	01	10	28	- 64.2 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	00	00	00	00	00	00	00	00	01	01	10	55	112	- 50 %
Measles	00	00	00	00	00	00	00	00	00	00	08	22	64	- 65 %
Rubella	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
CRS**	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Tetanus	00	00	00	00	00	00	00	00	00	00	01	03	04	0 %
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	06	07	- 14 %
Whooping Cough	00	00	00	00	01	00	00	00	00	00	02	03	25	- 88 %
Tuberculosis	00	00	00	00	00	00	00	00	00	00	180	1455	2409	- 39.6 %

**Key to Table 1 & 2**

**Provinces:** W: Western, C: Central, S: Southern, N: North, E: East, NC: North Central, NW: North Western, U: Uva, Sab: Sabaragamuwa.  
**RDHS Divisions:** CB: Colombo, GM: Gampaha, KL: Kalutara, KD: Kandy, ML: Matale, NE: Nuwara Eliya, GL: Galle, HB: Hambantota, MT: Matara, JF: Jaffna, KN: Killinochchi, MN: Mannar, VA: Vavuniya, MU: Mullaitivu, BT: Batticaloa, AM: Ampara, TR: Trincomalee, KM: Kalmunai, KR: Kurunegala, PU: Puttalam, AP: Anuradhapura, PO: Polonnaruwa, BD: Badulla, MO: Moneragala, RP: Ratnapura, KG: Kegalle.

**Data Sources:**  
**Weekly Return of Communicable Diseases:** Diphtheria, Measles, Tetanus, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS,  
**Special Surveillance:** AFP\* (Acute Flaccid Paralysis), Japanese Encephalitis  
**CRS\*\*** =Congenital Rubella Syndrome

**Dengue Prevention and Control Health Messages**

**Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them free of water collection.**

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