



# WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit  
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Vol. 49 No. 38

17<sup>th</sup>– 23<sup>rd</sup> Sep 2022

## The link between COVID-19 infection and Cardio-vascular disease Part I

This is a first part of a article that The link between COVID-19 infection and Cardio-vascular disease

### Introduction –

#### Coronavirus disease

Coronavirus disease (COVID-19) is a viral infection caused by the SARS-CoV-2 virus. It is an infectious disease that evolved into a global pandemic<sup>1</sup>. It was the 7<sup>th</sup> known human coronavirus to cause disease in human<sup>2</sup>. The virus is spread by respiratory droplets. The virus can also spread by direct contact with symptomatic or asymptomatic patients<sup>3</sup>. Respiratory symptoms of mild to moderate severity are observed in most of the patients. They usually require no special treatment. However, some persons will show severe symptoms requiring medical attention. The vulnerable groups are older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer. However, anyone at any age can get the COVID-19 infection and develop the serious disease or die<sup>1</sup>.

#### Cardiovascular diseases

Cardiovascular diseases are diseases affecting the heart and blood vessels. Among them, coronary heart disease and cerebrovascular disease (stroke) are encountered usually. Others include peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis (DVT) and pulmonary embolism (PE). Acute coronary heart disease and acute cerebrovascular disease (strokes) are mainly due to a blockage that averts blood from flowing to the heart or brain respectively. The obstruction is commonly due to the deposits of fat that accumulate on the

surface of the inner walls of the vessels providing blood to the heart or brain. Strokes can occur due to bleeding from a blood vessel in the brain or from a blood clot. Considering all global deaths in 2019, 32 % of deaths were due to cardiovascular diseases. Thus, it became the leading cause of death globally. Of these deaths, the majority (85%) were due to heart attack and stroke. More than 75 % of the deaths due to cardiovascular disease take place in low and middle-income countries. However, most cardiovascular diseases can be averted by addressing behavioural risk factors for cardiovascular diseases such as tobacco use, obesity, unhealthy diet, physical inactivity and harmful use of alcohol<sup>4</sup>.

#### Mechanism of action (SARS-COV-2 virus)

SARS-Cov-2 is a single-stranded enveloped RNA virus. Angiotensin-converting enzyme 2 (ACE 2) is the main receptor for the SARS-Cov-2 virus. A spike glycoprotein on the envelope of the SARS-Cov-2 virus binds to the ACE 2 receptor on the host cells allowing the virus to enter the host cells. ACE 2 receptors are present in many organs in the human body in varying degrees. In the respiratory system, it is present mainly in the lung, especially on type II alveolar epithelial cells. It is weakly expressed in the oral and nasal mucosa and nasopharynx. Thus, the lungs have become the primary target for the SARS-Cov-2 virus. Also, ACE2 is highly expressed in the myocardial cells. It counteracts the effects of angiotensin II in conditions with excessive activation of the renin-angiotensin system (e.g. hypertension, atherosclerosis and congestive heart failure)<sup>3</sup>. Furthermore, ACE 2 is also expressed in proximal tubule cells of the kidney, urothelial cells of the bladder and enterocytes of the small intestine mainly in the ileum.

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Thus, it provides a mechanism for the multi-organ dysfunction that can occur with SARS-CoV-2 infection. Through blood circulation, a cell-free and macrophage phagocytosis-associated virus may spread from the lungs to other organs with high ACE2 expression<sup>3</sup>.

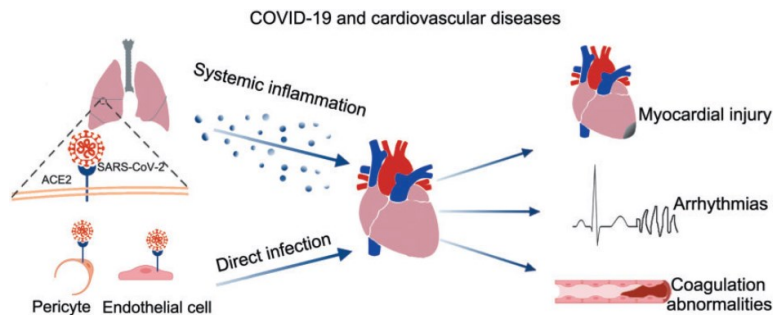


Figure 1- Schematic model of COVID-19 and CVD<sup>7</sup>

**Cardio-vascular effects in COVID-19**

There is growing evidence showing the association of COVID-19 with increased morbidity and mortality from cardiovascular disease (CVD).

The incidence of cardiovascular manifestations is high with COVID-19 infection. It is mainly due to the systemic inflammatory response and immune system disorders that take place during disease progression. One proposed mechanism of cardiac involvement is direct myocardial injury mediated via ACE2. The other proposed mechanisms are cytokine involvement and respiratory dysfunction caused by COVID-19, which is detrimental to myocardial cells. However, the exact mechanism of cardiac involvement in COVID-19 remains unclear

**Myocardial injury (MI)**

Myocardial injury is diagnosed with elevated levels of cardiac biomarkers or abnormality in electrocardiography (ECG) and echocardiography. According to a clinical case series, the incidence of MI in patients who were diagnosed with COVID-19 ranges from 7.2% to 19.2%. Thus, the incidence was relatively high among COVID-19 patients and it was positively related to mortality. Based on the biomarkers, MI in COVID-19 patients can be ascribed to two patterns. One of the patterns reflects cytokine storm and the other presents with predominantly cardiac symptoms indicating viral myocarditis or stress cardiomyopathy

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**Table 1 : Water Quality Surveillance  
Number of microbiological water samples August 2022**

District	MOH areas	No: Expected *	No: Received
Colombo	15	90	NR
Gampaha	15	90	NR
Kalutara	12	72	NR
Kalutara NIHS	2	12	NR
Kandy	23	138	NR
Matale	13	78	10
Nuwara Eliya	13	78	NR
Galle	20	120	NR
Matara	17	102	NR
Hambantota	12	72	NR
Jaffna	12	72	167
Kilinochchi	4	24	NR
Manner	5	30	0
Vavuniya	4	24	43
Mullatvu	5	30	0
Batticaloa	14	84	NR
Ampara	7	42	35
Trincomalee	11	66	NR
Kurunegala	29	174	NR
Puttalam	13	78	NR
Anuradhapura	19	114	NR
Polonnaruwa	7	42	0
Badulla	16	96	NR
Moneragala	11	66	NR
Rathnapura	18	108	NR
Kegalle	11	66	0
Kalmunai	13	78	0

\* No of samples expected (6 / MOH area / Month)  
NR = Return not received

**Table 1: Selected notifiable diseases reported by Medical Officers of Health 10<sup>th</sup>- 16<sup>th</sup> Sep 2022 (37<sup>th</sup> Week)**

RDHS	Dengue Fever		Dysentery		Encephaliti		Enteric Fever		Food Poi-		Leptospirosis		Typhus		Viral Hepa-		Human		Chickenpox		Meningitis		Leishmania-		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	21	9785	0	4	0	3	0	1	0	6	1	146	0	0	0	5	0	2	0	32	0	10	0	2	15	95
Gampaha	9	6067	0	5	0	1	0	1	0	12	1	147	0	0	1	10	0	4	0	41	0	31	0	29	6	85
Kalutara	23	3117	0	22	0	1	1	2	0	6	6	295	0	4	0	4	0	3	2	58	0	19	0	2	3	52
Kandy	0	4011	0	19	0	0	0	3	0	11	0	124	0	30	0	9	0	0	0	57	0	7	0	24	13	97
Matale	0	862	0	8	0	0	0	0	0	0	0	79	0	5	0	5	0	1	0	33	0	1	0	258	18	99
NuwareEliya	0	186	0	19	0	0	0	3	0	5	0	62	0	12	0	6	0	0	0	33	0	6	0	0	27	93
Galle	0	2996	0	9	0	1	0	0	0	0	0	328	0	27	0	5	0	0	0	60	0	17	0	0	13	99
Hambantota	0	1337	0	29	0	0	0	0	0	2	0	191	0	35	0	6	0	0	0	24	0	15	0	395	16	99
Matara	0	1367	0	12	0	2	0	0	0	0	0	195	0	12	0	1	0	0	0	37	0	6	0	209	30	99
Jaffna	0	2542	0	50	0	2	0	58	0	30	0	20	0	415	0	6	0	4	0	88	0	11	0	0	64	93
Kilinochchi	0	102	0	7	0	0	0	3	0	24	0	11	0	10	0	0	0	0	0	4	0	2	0	2	27	96
Mannar	0	177	0	2	0	0	0	0	0	0	0	23	0	3	0	2	0	0	0	6	0	15	0	0	19	77
Vavuniya	0	70	0	3	0	1	0	2	0	0	0	18	0	1	0	0	0	0	0	27	0	0	0	4	1	95
Mullaitivu	0	54	0	5	0	0	0	2	0	6	0	25	0	5	0	0	0	0	0	6	0	1	0	1	22	91
Batticaloa	0	1020	0	53	0	7	0	0	0	20	0	36	0	0	0	1	0	1	0	25	0	30	0	1	39	97
Ampara	0	134	0	10	0	1	0	0	0	17	0	84	0	1	0	1	0	0	0	41	0	20	0	12	11	93
Trincomalee	0	996	0	23	0	0	0	1	0	2	0	24	0	3	0	4	0	0	0	33	0	6	0	1	17	84
Kurunegala	0	2203	0	18	0	2	0	0	0	4	0	124	0	25	0	1	0	2	0	72	0	32	0	358	10	96
Puttalam	0	1686	0	3	0	0	0	0	0	0	0	22	0	7	0	1	0	0	0	13	0	23	0	4	15	89
Anuradhapur	0	350	0	9	0	2	0	1	0	5	0	135	0	21	0	2	0	1	0	52	0	38	0	291	10	88
Polonnaruwa	0	121	0	6	0	1	0	0	0	1	0	97	0	0	0	3	0	0	0	15	0	3	0	374	15	96
Badulla	0	845	0	19	0	2	0	1	0	13	0	188	0	41	0	117	0	0	0	44	0	11	0	17	17	99
Monaragala	0	390	0	6	0	1	0	4	0	3	0	235	0	24	0	46	0	0	0	51	0	37	0	112	11	97
Ratnapura	0	2321	0	39	0	6	0	3	0	27	0	733	0	21	0	21	0	0	0	63	0	48	0	168	13	92
Kegalle	0	2316	0	12	0	8	0	1	0	8	0	388	0	18	0	8	0	0	0	81	0	41	0	18	10	97
Kalmune	0	890	0	29	0	1	0	1	0	6	0	21	0	1	0	1	0	0	0	48	0	32	0	0	30	98
<b>SRI LANKA</b>	<b>53</b>	<b>45945</b>	<b>0</b>	<b>421</b>	<b>0</b>	<b>42</b>	<b>1</b>	<b>87</b>	<b>0</b>	<b>208</b>	<b>8</b>	<b>3751</b>	<b>721</b>	<b>1</b>	<b>265</b>	<b>18</b>	<b>2</b>	<b>1044</b>	<b>0</b>	<b>462</b>	<b>0</b>	<b>2282</b>	<b>18</b>	<b>18</b>	<b>94</b>	

Source: Weekly Returns of Communicable Diseases (esurveillance.epid.gov.lk). T=Timeliness refers to returns received on or before 16<sup>th</sup> Sep , 2022 Total number of reporting units 357 Number of reporting units data provided for the current week157 C\*\*=Completeness

**Table 2: Vaccine-Preventable Diseases & AFP** 10<sup>th</sup>- 16<sup>th</sup> Sep 2022 (37<sup>th</sup> Week)

Disease	No. of Cases by Province									Number of cases during current week in 2022	Number of cases during same week in 2021	Total number of cases to date in 2022	Total number of cases to date in 2021	Difference between the number of cases to date in 2022 & 2021
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	00	00	00	01	00	01	00	02	03	57	46	23.9 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	00	00	00	00	00	00	00	00	00	00	01	63	58	8.6 %
Measles	00	01	00	00	00	00	00	00	00	01	00	17	11	54.5 %
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	00	05	02	150 %
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	01	03	- 66.6 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	01	00	0 %
Tuberculosis	00	06	03	05	03	00	00	14	23	54	196	4790	3625	32.1 %

**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  
 NA = Not Available

Influenza Surveillance in Sentinel Hospitals - ILI & SARI							
Month	Human				Animal		
	No Total	No Positive	Infl A	Infl B	Pooled samples	Serum Samples	Positives
September							

Source: Medical Research Institute & Veterinary Research Institute

Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to [chepid@sltnet.lk](mailto:chepid@sltnet.lk). **Prior approval should be obtained from the Epidemiology Unit before publishing data in this publication**

**ON STATE SERVICE**

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