WEEKLY EPIDEMIOLOGICAL REPORT

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Effectiveness of Chloroquine in the management of COVID-19 Part I

The current pandemic caused by the novel coronavirus SARS-CoV-2 is spreading rapidly, causing devastating effects in many countries. The scientists are in a race against the time to find an effective treatment to curtail the infection. In the absence of a specific and effective pharmacological treatment, their attention has focused on repurposing an available drug for the management of pneumonia caused by SARS-CoV-2. The drugs that have shown promising results for the current pandemic are chloroquine and its hydroxyl analogue, hydroxychloroquine.

Chloroquine (CQ) is a 9-aminoquinoline which was considered the drug of choice against malaria, until the emergence of CQ resistance in the 1960s. Since then its importance as an anti-malarial has diminished. However, due to many other properties it possesses, it has gained an interest in the treatment of other conditions. Apart from the anti-malarial properties, it also has anti-inflammatory, anti-fungal, anti-bacterial and anti-viral properties, warranting its' use in the management of autoimmune diseases such as Rheumatoid Arthritis and Systemic Lupus Erythematous and other infectious diseases. The known safety profile and pharmacokinetics of CQ, along with the low cost, make it an ideal drug for repurposing for other diseases.

Mechanism of action of CQ against viruses

In vitro studies to assess the anti-viral properties of CQ has shown that it is active against a diverse group of RNA viruses such as Rabies virus, Poliovirus, HIV, Hepatitis A virus, Hepatitis C virus, Influenza A and B viruses, Influenza A H5N1 virus, Chikungunya virus, Dengue virus, Zika virus, Lassa virus, Hendra and Nipah viruses, Crimean–Congo haemorrhagic fever virus and Ebola virus, as well as some DNA viruses such as hepatitis B virus and herpes simplex.

The inhibition of viral replication in the cells by CQ is brought about by several mechanisms, which may differ according to the pathogen. The main mechanisms are given below.

- CQ passively diffuses into organelles such as endosomes, lysosomes and Golgi vesicles and raises the environmental pH. This will inhibit the low-pH-dependent steps of viral replication, including fusion and un-coating (Ex: its' action against Hepatitis A virus and Influenza B virus).
- The pH increase within these organelles may also inhibit post-translational modifications of the virus envelope glycoproteins by enzymes require a low pH for their activity such as proteases and glycosyltransferases within the trans-Golgi network and endoplasmic vesicles (Ex: its action against Flaviviridea, HIV and Coronavirus).
- Immune-modulatory and anti-inflammatory mechanisms (Ex: SARS-CoV)

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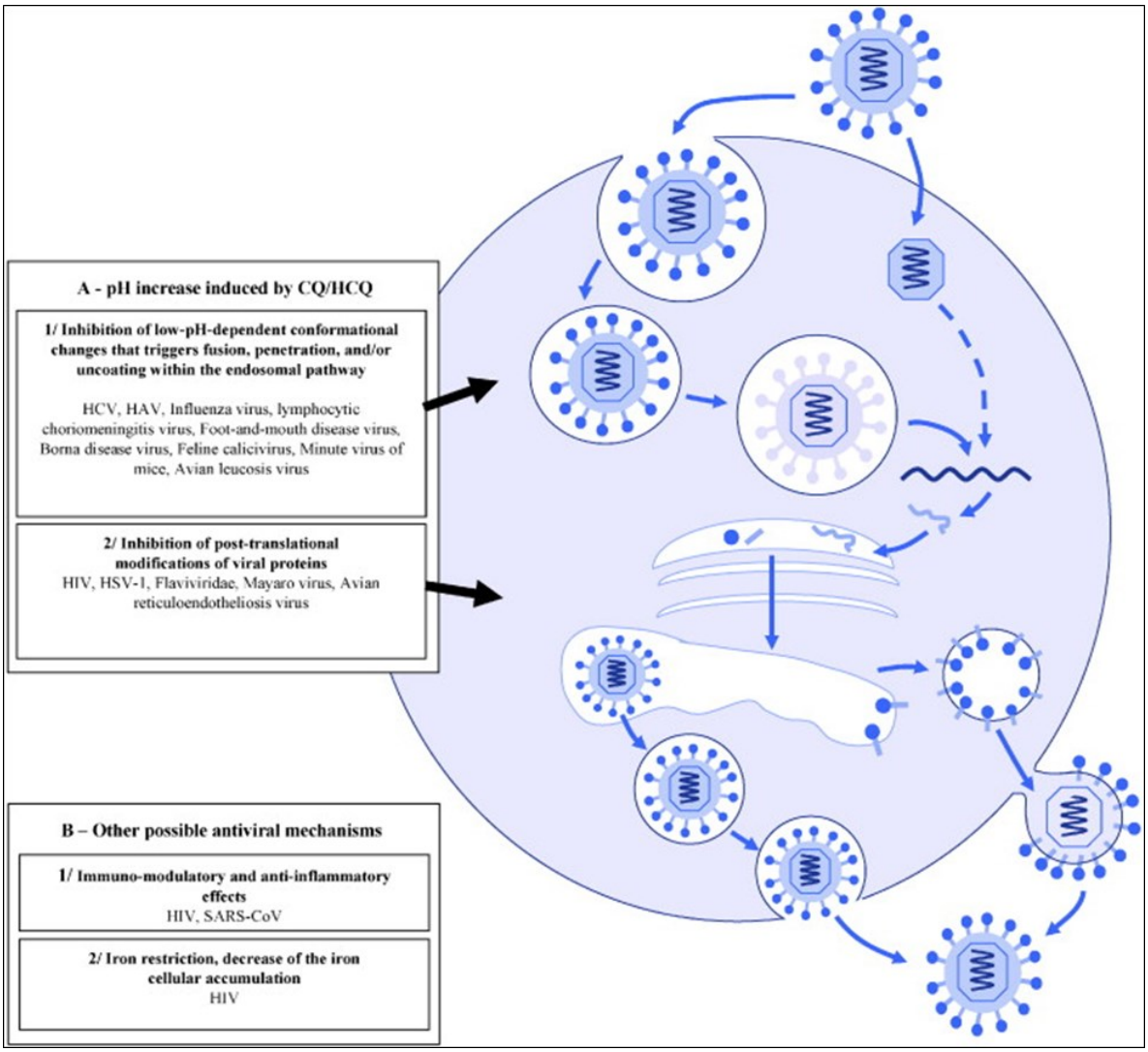

Figure 1: The process of viral replication within the cells and the points of action of CQ (Rolain et al., 2007)

However, these in-vitro results have not been replicated in in-vivo studies carried out for Ebola virus, Nipah virus and Influenza virus and in the clinical trials carried out for Influenza and Dengue infections. Clinical trials carried out about HIV and Hepatitis C infections have also not produced promising results. Further, it should be noted that in a clinical trial carried out to assess the effectiveness of CQ against the Chikungunya virus, not only did it not show any improvement of the acute illness, but it also increased the frequency of chronic complications such as arthralgia. Thus more studies are needed to establish its clinical effectiveness against viral infections.

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to be continued ...

Table 1: Selected notifiable diseases reported by Medical Officers of Health 29th– 06th Mar 2020 (10th 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	92	2543	2	9	0	3	1	4	0	13	4	53	0	0	0	2	0	0	21	117	3	14	0	0	**58**	**98**
Gampaha	47	1548	0	3	0	0	1	4	16	16	9	35	0	1	0	0	0	0	19	175	1	8	4	17	**52**	**100**
Kalutara	35	844	0	5	0	4	0	3	0	1	7	77	0	6	0	0	0	0	18	111	0	9	0	0	**62**	**100**
Kandy	26	990	0	6	0	1	0	7	2	6	1	14	1	33	1	2	0	0	14	68	1	13	3	23	**67**	**100**
Matale	13	399	0	3	0	2	0	1	0	3	2	15	0	2	0	2	0	1	5	24	0	1	6	97	**63**	**99**
NuwaraEliya	5	117	1	7	0	0	0	0	0	0	0	12	1	33	0	1	0	0	9	36	2	5	0	0	**23**	**100**
Galle	29	925	0	9	1	7	0	2	0	12	16	156	0	19	0	1	0	0	16	164	1	13	0	2	**58**	**96**
Hambantota	12	246	0	4	0	0	0	1	0	10	2	51	1	12	0	2	0	0	6	78	0	7	37	222	**73**	**100**
Matara	3	349	0	7	0	3	0	0	0	0	3	80	0	4	0	6	0	0	3	66	0	4	0	117	**51**	**91**
Jaffna	81	1632	1	29	0	0	0	14	0	15	0	9	13	403	0	0	0	1	9	47	0	2	0	0	**38**	**93**
Kilinochchi	5	100	1	9	0	0	0	2	0	0	0	5	1	13	0	0	0	0	1	4	0	3	0	2	**68**	**100**
Mannar	0	115	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	1	3	0	0	**47**	**98**
Vavuniya	3	214	0	3	0	0	0	3	0	0	0	29	0	1	0	0	0	0	2	10	0	3	0	1	**53**	**100**
Mullaitivu	0	60	0	3	0	0	0	3	0	1	0	9	0	2	0	0	0	1	0	2	0	0	0	5	**35**	**80**
Batticaloa	108	1846	2	30	0	0	0	0	0	3	1	12	0	0	0	0	1	1	5	45	0	9	0	1	**63**	**100**
Ampara	16	256	1	6	0	1	0	0	0	0	2	21	0	0	0	0	0	0	15	51	0	7	0	4	**66**	**100**
Trincomalee	46	2036	0	4	0	0	0	0	0	1	0	10	0	2	0	0	0	0	8	54	0	5	0	0	**53**	**89**
Kurunegala	23	618	0	5	1	4	0	2	0	27	2	54	0	10	0	1	0	0	21	201	2	7	9	128	**55**	**99**
Puttalam	12	314	0	5	0	1	0	2	1	1	0	15	0	9	0	0	0	1	2	47	0	12	0	2	**70**	**98**
Anuradhapur	8	281	1	8	0	1	0	2	0	19	6	112	0	9	0	1	0	1	9	77	2	14	5	68	**57**	**93**
Polonnaruwa	10	168	0	4	0	0	0	0	0	0	1	49	0	0	3	5	0	0	0	44	0	8	11	79	**63**	**100**
Badulla	17	338	0	6	1	2	0	2	0	3	9	84	4	12	0	6	0	0	12	69	2	14	2	4	**61**	**100**
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		
Ratnapura	21	523	0	27	0	10	0	1	1	13	23	242	0	9	0	8	0	0	8	94	1	31	8	36	**49**	**99**
Kegalle	20	323	1	5	0	3	0	1	0	12	7	64	1	14	1	3	0	0	12	84	3	11	1	9	**61**	**100**
Kalmune	21	779	2	23	0	2	0	0	0	1	0	2	0	2	0	0	0	0	18	117	0	11	0	0	**78**	**100**
SRILANKA	**653**	**17564**	**12**	**220**	**3**	**44**	**2**	**54**	**20**	**157**	**95**	**121**	**22**	**597**	**5**	**40**	**1**	**6**	**233**	**1785**	**19**	**214**	**86**	**817**	**58**	**94**

Source: Weekly Returns of Communicable Diseases (WRCD).

*T=Timeliness refers to returns received on or before 06th March , 2020 Total number of reporting units 356 Number of reporting units data provided for the current week: 309 C**-Completeness

A = Cases reported during the current week. **B** = Cumulative cases for the year.

Table 2: Vaccine-Preventable Diseases & AFP

29th – 06th Mar 2020 (10thWeek)

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	01	01	00	00	01	00	00	00	03	01	09	20	- 55 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	01	01	01	00	03	01	01	00	02	10	05	45	72	- 37.5 %
Measles	00	02	02	00	01	00	00	00	00	05	04	18	38	- 52.6 %
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	- 25 %
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	06	02	200 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	03	02	16	- 87.5 %
Tuberculosis	118	20	47	14	20	20	00	09	09	257	159	1455	1748	- 16.7 %

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.

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. Prior approval should be obtained from the Epidemiology Unit before publishing data in this publication**

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