





## A review on severe acute respiratory syndrome (SARS)

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### Abstract

Severe acute respiratory syndrome (SARS) is a newly arose illness that quickly spread all over the world. The ailment arose in south China including a new coronavirus (SARS-COV) was suspected of being involved as the underlying cause. The trail the said pathogen ended up taking to set up human illness abide uncertain, nevertheless initial findings said that the roots of this disease was from intermediate animal host. Hospital acquired spreading of SARS-COV has become a prominent characteristic during the pandemic. The disease is comparable to several RTI 's, even though huge percentage of victims exhibit a sharp decrease in health with airway obstruction near the 2nd week ending of infection. The Treatment methods are pretty much identical as the treatment of many other communicable lung infections however the measures for restricting the disease start taking a prominent aspect. Also, the antiviral drug action has not been proved counter to SARS-COV. One of the best striking characteristics of this disease outbreak was the rapidity for this the entire world started acting in a cohesive way to manage it. The entire review discusses the etiology, epidemiology, clinical manifestations, diagnostic methods, preventive care, pathology and pathogenesis of severe acute respiratory syndrome along with its treatment.

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### INTRODUCTION

Severe acute respiratory syndrome is an acute viral infectious respiratory illness prompted by SARS-associated corona virus [1].

Severe acute respiratory syndrome is a rapidly progressive respiratory syndrome. Which was recognised by world health organization in 2002 in Guangdong one of the provinces of China, and issued as a global threat in march 2003. SARS had become the 1st pandemic of 21st century by spreading over 30 countries over the following months [2].

By the end of the outbreak of the spreading of the SARS in July 2003, a total of 8096 cases including 774 death cases were reported throughout the world with a mortality rate of 9.6%. The emergence of SARS featured the evolution of multiple novel pathogens like H5N1 influenza, Nipah virus, Hanta virus and avian flu. However, among these pathogens SARS is unique owing to its capacity and efficacy of transmission from person to person [3].

The causative agent which causes SARS was identified by the world health organization along with centres for disease control and prevention in under two weeks from the outbreak. The agent was a novel corona virus strain and was given the name SARS associated corona virus (SARS-COV). Before finalising this as a causative agent, the research teams believed the corona virus being causative agent as it isolated from the secretions of number of SARS patients. The mode of transmission of the virus is through inhaling the air droplets of virus. The treatment of SARS includes primarily supportive and the anti-viral agents are also not effective [4].

### **Etiology**

The etiological link between corona virus and SARS was identified in Hong Kong. And this confirmation was done by satisfying all the Koch postulates.

The SARS-COV had been found in the respiratory exudations of the SARS victims. By testing the urine, faeces and lung biopsy samples of patients suffering with SARS. This micro-organism was separated from the secretions of the SARS patients by using many techniques such as serological technique, RT-PCR tests etc. Scientists done experimental infection of SARS-COV in monkeys [5]. It produces similar infection just like in SARS patients in the monkeys. Also, the corona virus which causes the SARS infection is mainly similar with the ones which present in bats. Thus, the scientists said that may be the source of the SARS-COV is from bats. And also, research teams discovered several corona virus strains which are closely and genetically related to the SARS-COV in two animal species i.e., masked palm civet cat and raccoon dog in Hong Kong and Shenzhen – China. Also, the antibodies against this virus are discovered in Chinese ferret badger. These three

species are the wild animals which are traditionally sold in the commercial markets for the human consumption throughout the southern China [6].

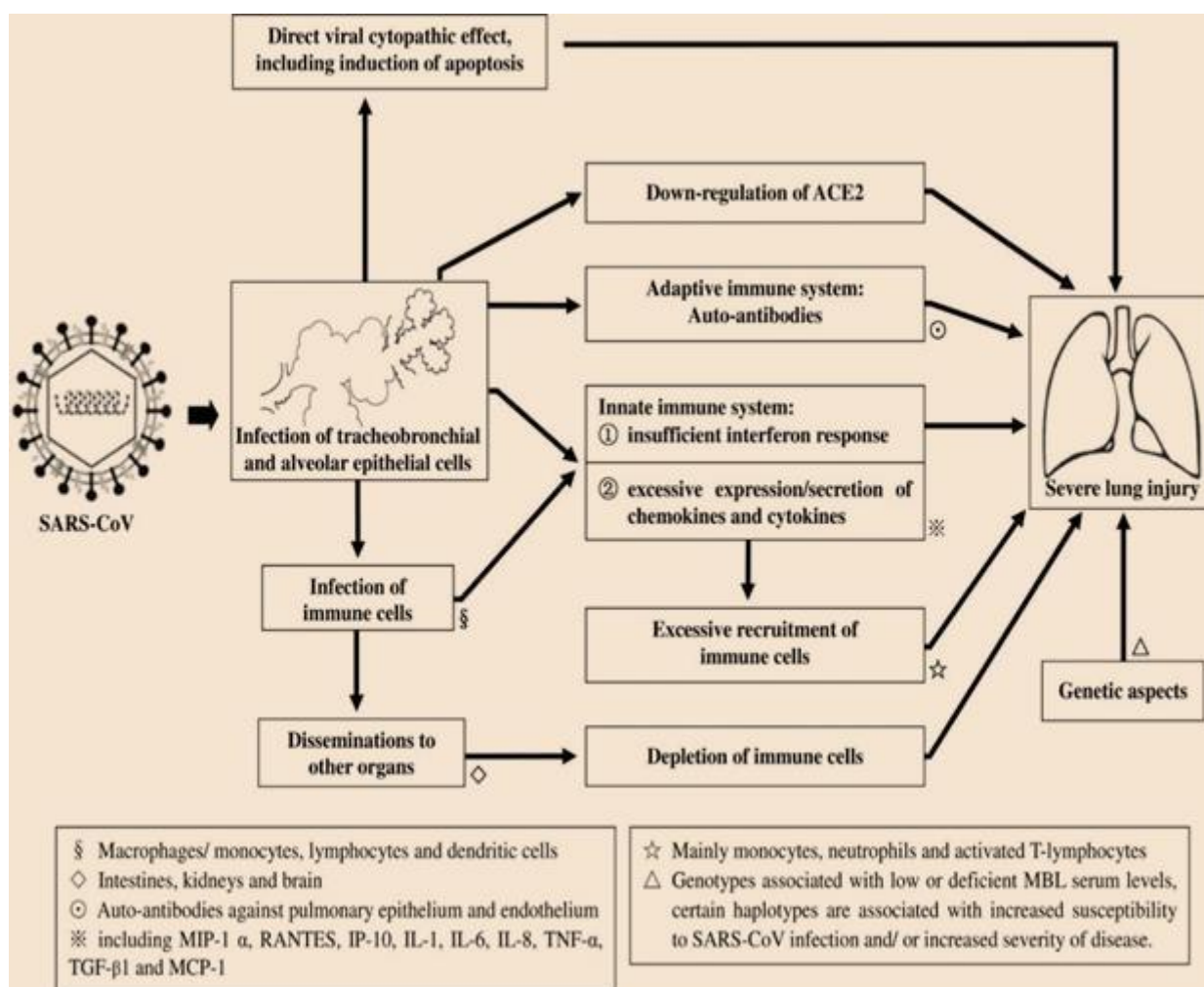
### **Epidemiology**

Severe acute respiratory syndrome incidences first reported in Guangdong one of the Chinese provinces in November of 2002 like an epidemic of unusual, severe communicable bronchitis incidents. Also, the 1st instances of SARS discovered in animal attendants whom have acquaintance with the feral creatures, which include palm civet cat which is eventually known as the secondary moderator of the pathogen [7].

During the outbreak majority of the cases reported in China like 83% and then in united states. This total outbreak guided to 8096 instances and 774 victims were died. High rate of risk is to elderly patients with a fatality rate of 43% in elderly adults above 60 [8]. Mainly grownups are impacted by the SARS, children were also affected by this though in less number and no deaths were reported in children. Health care persons were severely impacted by this disease and played big role in boosting up the transmission of severe acute respiratory syndrome. Health care workers held 21% of cases in the outbreak of disease. By the end of July 2003, hardly new infections were noted throughout the world, which leads to lifting of the rules on travelling by who which it placed during the pandemic and also to announce ending of the epidemic [9]. From the midyear of 2004 no cases of SARS were revealed but between the end of 2003 and starting of 2004 there is reemergence of virus due to accidental lab exposure. Like many other respiratory viruses, SARS-COV also spread through person to person by majorly droplet scattered process and also through direct spreading with the patient exudations. After transferring the incubation time of virus is often 2 to 7 days with 95% emerging signs after day 10. Maximum viral release takes place in respiratory exudations 6 to 11 days after initial symptoms [10].

### **Pathophysiology**

**Mode of Transmission:** Major route SARS does seem to disperse would be by near man-to-man interaction. The pathogen that induces SARS is believed to be transferred often quickly by respiratory globules generated whenever an



**Figure 1 Pathogenesis of SARS**

infected individual wheezes as well as sniffles [11]. Beads disperse could occur once globules in snuffle as well as wheezes of a diseased individual are progressed a brief decent distance to three feet in the wind also stored upon that mucosal surface of the eyes, mouth, as well as nose of individuals who seem to be close [12]. The pathogen may also be infected to people who contacts a place as well as item tainted with contagious beads but then comes into contact with their mouth, nose, as well as eyes. Moreover, it's indeed conceivable that perhaps the SARS pathogen could well expand so much widely by the air.

This mode of transmission is of mainly three types. They are [13][14]

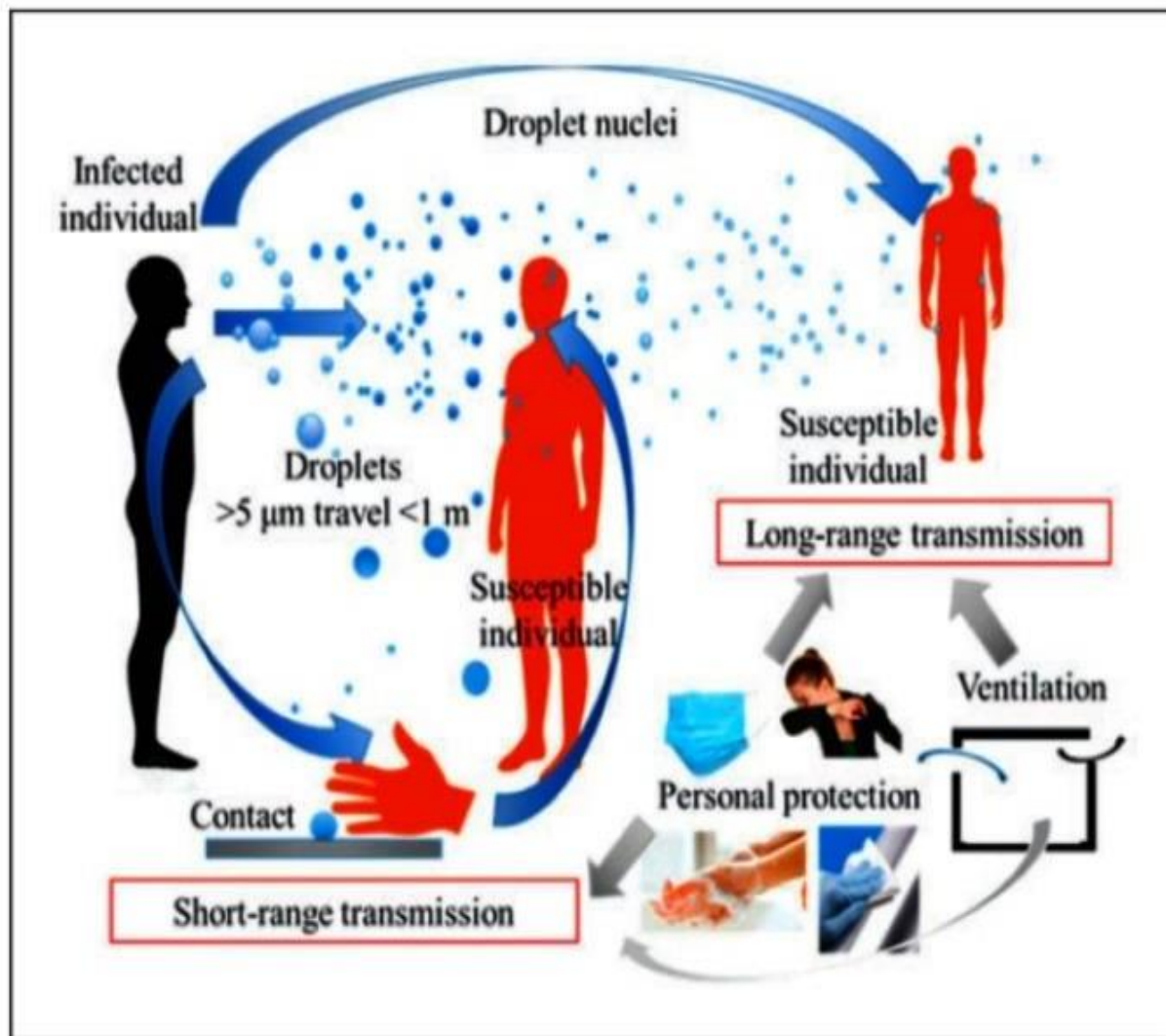
- Droplet transmission
- Contact transmission
- Airborne transmission

### Droplet Transmission

Respiratory transfer of SARS-COV could happen through droplet transmissions. Spreading through globules occurs during bearers of the viral infection speaking, wheezing, inhaling as well as sniffing eject bioaerosol particulate that could contact someone else people's mouth, eyes, as well as nose leading to infectious disease.

### Contact Transmission

The contact transmission of SARS-COV could occur by surface areas as well as things tainted with SARS-COV, in which pathogens could continue to survive which led to illness for a few hours and perhaps even days. For example, SARS-COV could sustain 2–9 days upon that surface areas and things.



**Figure 2 Mode of Transmission of SARS**

### **Airborne transmission**

The process of air - borne transmitting specifically attuned particle nuclei as well as particulate matter along with the pathogen which can remain in the air for such a longer length of time ( $\geq 2$  h) and also can relocate much further ranges from bearers of SARS-COV.

For instance, air - borne globules which are liberated throughout the time of breathing as well as sniffing by SARS-COV bearers, might well relocate a few meters (8 m), remain for almost 30 min, and stay intact on things for some days.

### **Symptoms [15]**

The most important symptoms of SARS seem to be chills, dry cough, chills, malaise, fever, myalgia,

dyspnoea and headache. Throat infection, mucus production, rhinorrhoea, nausea, emesis, and drowsiness is much less frequent. Watery diarrhoea had been displaying along 40% to 70% of sick people with SARS and typically took place for 1 week since initial infection. SARS-COV had been identified with in cerebrospinal fluid and serum of 2 sick people intricated by relapses. Geriatric persons accompanied by SARS-COV disease could perhaps exist with less insatiable hunger, a lesson generally healthy person, cracking as well as ambiguity, even though some elderly individuals may not have been able to mount a febrile reaction. In comparison, SARS-COV disease in kids ages under twelve years was relatively innocuous, and whilst disease in young teens closely resembles that within grownups.

### Complications [16]

Severe acute respiratory syndrome induces numerous pneumonic and extrapulmonary problems. Which are:

- Respiratory complications
- Cardiovascular complications
- Acute renal failure
- Osteonecrosis
- Bacterial and fungal superinfection
- Endocrine
- Hepatitis
- Psychiatric complications

### Diagnosis [17]

The main diagnostic tests for this disease are,

- Reverse Transcriptase-Polymeric Chain Reaction (RT-PCR)
- Complete blood count (CBC) with differential
- Blood cultures
- Pulse oximetry
- Gram stain
- Chest x-ray
- Sputum culturing
- Urinary antigen tests
- Pneumococcal antigen test
- Legionella test

### Treatment [18][19]

The specific treatment for severe acute respiratory syndrome is still unknown. But the management of this disease is done by their symptomatic medications. Also, some antiviral agents are used during the epidemic.

Antiviral Therapy

- Ribavirin
- Combination of Lopinavir with Ribavirin
- Combination of Lopinavir with Ritonavir
- Corticosteroids
- Methylprednisolone
- Prednisolone

Convalescent plasma

Immunoglobulin Therapy

Non-Invasive positive pressure ventilation

Traditional Chinese medicine

### Prevention [20]

- washing hands with sanitizers
- wearing disposable gloves
- wearing a surgical mask during with people
- washing the personal things
- disinfecting the surfaces around the population
- maintain social distance

### CONCLUSION

The SARS pandemic illustrated a certain new hyper virulent pathogen traversing the boundary between the animal and human stay crucial to public health safety. SARS presented a serious task regarding world - wide health care services with its unexpected arrival, quick spreading, as well as extinction. The understanding and knowledge gained from SARS-COV epidemiological studies, method of delivery, course of illness, health problems, patient treatment, indicators of less results, as well as infection prevention and control have been tremendously helpful. Although no huge epidemics have taken place from the last revealed SARS incidents involving health care workers in Hong Kong as well as Taiwan, regardless of whether SARS will pop back up and end up causing some other epidemic remains uncertain.

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### REFERENCES

- [1] Vincent C C Cheng, Jasper F W Chan, Kelvin K W To, and K Y Yuen. Clinical



- management and infection control of SARS: lessons learned. *Antiviral Research*, 100(2):407,2013.
- [2] Dennis J Cleri, Anthony J Ricketti, and John R Vernaleo. Severe acute respiratory syndrome (SARS). *Infectious Disease Clinics of North America*, 24(1):175-202,2010.
- [3] Ken Yan Ching Chow, Chung Chau Hon, Raymond Kin Hi Hui, Raymond Tsz Yeung Wong, Chi Wai Yip, Fanya Zeng, and Frederick Chi Ching Leung. Molecular advances in severe acute respiratory syndrome-associated coronavirus (SARS-CoV). *Genomic, Proteomics and Bioinformatics*, 1(4):247-62, 2003.
- [4] Jiang Gu, Encong Gong, Bo Zhang, Jie Zheng, Zifen Gao, Yanfeng Zhong, Wanzhong Zou, Jun Zhan, Shenglan Wang, Zhigang Xie, Hui Zhuang, Bingquan Wu, Haohao Zhong, Hongquan Shao, Weigang Fang, Dongshia Gao, Fei Pei, Xingwang Li, Zhongpin He, Danzhen Xu, Xeying Shi, Virginia M Anderson, and Anthony S-Y Leong. Multiple organ infection and the pathogenesis of SARS. *Journal of Experimental Medicine*, 202(3):415-424,2005.
- [5] Jiang Gu, and Christine Korteweg. Pathology and pathogenesis of severe acute respiratory syndrome. *The American Journal of Pathology*, 170(4):1136-1147,2007.
- [6] Rima F Khabbaz. Still learning from SARS. *Annals of Internal Medicine*, 159(11):780,2013.
- [7] Rolf Hilgenfeld, and Malik Peiris. From SARS to MERS: 10 years of research on highly pathogenic human coronaviruses. *Antiviral Research*, 100(1):286,2013.
- [8] David S C Hui, and Alimuddin Zumla . Severe Acute Respiratory Syndrome: Historical, Epidemiologic, and Clinical Features. *Infectious Disease Clinics of North America*, 33(4):869-889,2019.
- [9] David M Hwang, Dean W Chamberlain, Susan M Poutanen, Donald E Low, Sylvia L Asa, and Jagdish Butany. Pulmonary pathology of severe acute respiratory syndrome in Toronto. *Modern Pathology*, 18:1-10, 2005.
- [10] Marco A Marra, Steven J M Jones, Caroline R Astell, Robert A Holt, Angela Brooks-Wilson, Yaron S N Butterfield, and Jaswinder Khattra,. The genome sequence of the SARS- associated coronavirus. *Science*, 300:1399-1404,2003.
- [11] John M Nicholls, Leo L M Poon, Kam C Lee, Wai F Ng, Sik T Lai, Chung Y Leung, Chung M Chu, Pak K Hui, Kong L Mak, Wilina Lim, Kin W Yan, Kwok H Chan, Ngai C Tsang, Yi Guan, Kwok Y Yuen, and J S Malik Peiris. Lung pathology of fatal severe acute respiratory syndrome. *The Lancet*, 361:1773-1778,2003.
- [12] Umesh D Parashar and Larry J Anderson. Severe acute respiratory syndrome: review and lessons of the 2003 outbreak. *International Journal of Epidemiology*, 33(4):628-634,2004.
- [13] J S M Peiris, S T Lai, L L M Poon, Y Guan, L Y C Yam, W Lim, J Nicholls, W K S Yee, W W Yan, M T Cheung, V C C Cheng, K H Chan, D N C Tsang, R W H Yung, T K Ng, and K Y Yuen; SARS study group. Coronavirus as a possible cause of severe acute respiratory syndrome. *The Lancet*, 361: 1319-1325,2003.
- [14] J S M Peiris. Severe Acute Respiratory Syndrome (SARS). *Journal of Clinical Virology*, 28(3):245-247,2003.
- [15] L L M Poon, Y Guan, J M Nicholls, K Y Yuen, and J S M Peiris. The aetiology, origins, and diagnosis of severe acute respiratory syndrome. *The Lancet Infectious Diseases*, 4(11):663-671,2004.
- [16] James B Mahony, and Susan Richardson. Molecular diagnosis of severe acute respiratory syndrome: the state of the art. *The Journal of Molecular Diagnostics*, 7(5):551-9, 2005.
- [17] Priya Sampathkumar, Zelalem Temesgen, Thomas F Smith, and Rodney L Thompson. SARS: epidemiology, clinical presentation, management, and infection control measures. *Mayo Clinic Proceedings*, 78(7):882-890,2003.
- [18] Julia A Segre. What does it take to satisfy Koch's postulates two centuries later? Microbial genomics and Propionibacteria acnes. *Journal of Investigative Dermatology*, 133(9):2141-2142,2013.

- [19] Arjun Srinivasan, Lawrence C McDonald, Daniel Jernigan, Rita Helfand, Kathleen Ginsheimer, John Jernigan, and Linda Chiarello, . Foundations of the severe acute respiratory syndrome preparedness and response plan for healthcare facilities. *Infection Control and Hospital Epidemiology*,25(12):1020-1025,2004.
- [20] G M-K Tse, K-F To, P K-S Chan, A W I Lo, K-C Ng, A Wu, N Lee, H-C Wong, S-M Mak, K-F Chan, D S C Hui, J J-Y Sung, and H-K Ng. Pulmonary pathological features in coronavirus associated severe acute respiratory syndrome (SARS). *Journal of Clinical Pathology*, 57:260-266,2004.

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