بسم الله الرحمن الرحيم

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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

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Typical and Atypical Chest Computed Tomography Manifestatons in (COVID-19) Patients

Thesis

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List of Abbreviations

Abb.	Full term

ACE2 .....Angiotensin-converting enzyme 2

AKI .....Acute kidney injury

ARDS .....Acute respiratory distress syndrome

BAC .....Bronchoalveolarcarcinoma

COP .....Cryptogenic organizing pneumoni

COVID-19 .....Coronavirus disease 2019

CT .....Computed tomography

DIP.....Desquamative interstitial pneumonia

ECMO.....Extracorporeal membrane oxygenation

GGO .....Ground-glass opacity

HRCT.....High-resolution Computed tomography

ICU .....Intensive care unit

IFN- .....Interferon

IL .....Interleukin

IQR .....Interquartile range

Kvp .....Kilovoltage peak

LAM.....Lymphangioleiomyomatosis

mAs .....Milliampere-seconds

NS .....Nonsignificant

NSIP.....Nonspecific interstitial pneumoni

PCP .....Pneumocystis pneumonia

PLC.....Pulmonary lymphangitic carcinomatosis

RNA .....Ribonucleic acid

List of Abbreviations (Cont…)

Abb.	Full term
RT-PCR	*Reverse transcription polymerase chain reaction*
S	*Significant*
SARS-CoV -2	*Severe acute respiratory syndrome coronavirus 2*
SD	*Standard deviation*
SPSS	*Statistical package for Social Science*
TB	*Tuberculosis*
TMPRSS2	*Transmembrane serine protease 2*
TNF-α	*Tumour necrotic factor-α*
UIP	*Usual interstitial pneumonia*
WHO	*World Health Organization*

INTRODUCTION

The WHO China Country Office was notified in December 2019 of instances of pneumonia with an unclear aetiology discovered in Wuhan City, Hubei Province, China. As of 3 January 2020, China's national authorities had reported a total of 44 people with pneumonia of undetermined cause to WHO.[1]

Risk assessment by the World Health Organization:

There was insufficient data to assess the total risk of this type of pneumonia with an unknown cause. A stated connection to a wholesale fish and live animal market could indicate animal exposure.[1]

The symptoms reported by the patients are similar to those of various respiratory infectious illnesses, such as pneumonia. However, the incidence of 44 instances of pneumonia requiring hospitalisation that occurred at the same time and in the same place should be regarded with caution.[1]

Globally, 4593 confirmed COVID-2019 cases have been recorded as of January 28, 2020. 4537 of them were from China, while 56 came from 14 other nations. In addition, China is suspected of having 6973 instances. There have been 106 deaths as of January 28, 2020, all in China.[5]

The WHO has declared this outbreak a global health emergency and has asked for greater research into the lab tests, lung imaging, and differential diagnosis that have been considered.(6)

A new coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was discovered, and the condition associated with it was named coronavirus disease 2019 as a result (COVID-19).(7)

COVID-19 was declared a pandemic by the World Health Organization in March 2020, with over 2 million cases reported, primarily in the United States, Spain, and Italy.(8)

Globally, there have been roughly 239,007,759 confirmed cases of COVID-19, with 4,871,841 deaths reported to WHO up till October 14, 2021.(9)

The WHO's pandemic containment approach

The "Three C's" define scenarios in which the COVID-19 virus is more easily transmitted:

- Congested areas;
- Close-contact situations, as when people converse close to one another;
- Confined and enclosed spaces with insufficient ventilation. (10)

Basic public health procedures such as home isolation, quarantine, remote working, cancellation of public gatherings, travel restrictions, and school closure are all being implemented to deal with the situation.[11]

Raising immunisation knowledge, wearing masks, social distancing, handwashing, and sanitising surfaces all help to reduce the risk of illness.[11]

Other efforts include monitoring the health of symptomatic persons via phone or online health consultations, as well as providing life-saving equipment such as oxygen, mechanical ventilators, and extracorporeal membrane oxygenation (ECMO) machines.[6]

Susceptibility

Older adults are more likely to get severely ill from COVID-19. More than 81% of COVID-19 deaths occur in people over age 65. The number of deaths among people over age 65 is 80 times higher than the number of deaths among people aged 18-29.[12]

Patients with chronic diseases as cancer, cardiovascular disease, chronic respiratory disease, diabetes, obesity and chronic kidney diseases are at higher risk of developing serious complications.[12]

However, anyone at any age can get severely ill from Sars-Cov 2 and need to be hospitalized, intensive care or die. [12]

Recognition of at-risk patients could permit early institution of intensive care and antiviral and immune treatment to reduce the complications related to the cytokine storm syndrome.[13]

Diagnosis

Rapid and accurate detection of COVID-19 is important to control outbreaks in the community and in hospitals. Current highly specific diagnostic test for coronavirus is reverse-transcription polymerase chain reaction (RT-PCR), specimen is obtained through nasopharyngeal and oropharyngeal swab. (RT-PCR) has become a standard assessment for diagnosis of COVID-19 infection.[14]

The sensitivity of RT-PCR at the initial presentation is 60–71%.[15]

The main laboratory findings in COVID-19 are lymphopenia, elevated D-DIMER, inflammation-related parameters ex high CRP, elevated serum ferritin levels, and increased LDH which is an important marker of lung damage.[16]

However, chest computed tomography (CT) is recommended in the diagnosis, assessment the severity and follow-up of COVID-19 due to its high sensitivity as described

by Ai et al[17] and Caruso et al[3] where both studies reported CT sensitivity of 97%. This is helpful in detection of covid-19 infection despite negative RT-PCR results.[18]

Lung abnormalities on chest CT scan were most severe approximately 10 days after the initial onset of symptoms. COVID-19 also manifests with chest CT imaging abnormalities in asymptomatic patients, with rapid progression from focal unilateral to diffuse bilateral ground-glass opacities that progressed to or associated with consolidations within 1-3 weeks. Integrated assessment of imaging results with clinical and lab findings help in early diagnosis and treatment of COVID-19 pneumonia.[19]

Human coronaviruses can be efficiently inactivated within 1 min using surface disinfection procedures with 62-71% ethanol, 0.5% hydrogen peroxide or 0.1% sodium hypochlorite.[20]

The COVID-19 pandemic is a public health emergency of international concern, and all countries need a coordinated international effort to fight and eradicate COVID-19.[11]