

Coronavirus (COVID-19), Origin, Infectivity, Epidemics, Therapeutics and Global Impacts

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Abstract

The coronavirus (COVID-19) outbreaks and pandemic is growing rapidly in the past one year. In the past one year, total number of the infectious people is over one hundred million globally. It means we are still battling against viral epidemic spreading and therapeutic benefiting. The origin and pandemic of COVID-19 raised our concern greatly. To speed up global efforts against COVID-19, some evidence and association are noticed and discussed in the following. Collectively, epidemic condition, countrywide lockdown, therapeutic validity and preventive policy are addressed respectively. These patterns of medical experience can be introduced for facilitating and enhancing a possibility of futuristic guidance in new clinical scenarios.

Keywords: *Infectious Disease; COVID-19; Viral Treatment; Viral Origin; Herbal Medicine; Drug Development; Viral Vaccines; Clinical Trial*

Introduction

Epidemic progress

The coronavirus (COVID-19) pandemic is growing rapidly in the past year [1,2]. The patient number spirals since this February. In the past week, the global case of coronavirus infectious people is surpasses 100,000,000. Many management systems and policy did not take action. As a result, a retrospective is needed.

An overview

The origin and pandemic of COVID-19 raises serious medical and healthcare concern worldwide, quick responses and mobility of active participants (medical doctors and other staffs or equipments) contribute a lot. Some evidence and associations are carefully compared among different medical and scientific disciplines. Epidemic condition, countrywide preventive efforts against virus spread, effective therapeutic comparisons and a large volume of medical devise utility worldwide are addressed respectively. We wish this important medical topic can be well discussed and improved in futuristic guidance.

Impacts for other scientific disciplines

Due to enormous investments and assists for fighting against COVID-19, most other scientific disciplines are greatly affected [3,4]. A lot of medical facilities and animal breeding are halted [5]. This scientific investigation halt and global economic impact is huge. Thus, immediate social and scientific investigation in the labs and medical education recovery meant a lot. Medical knowledge information and education halt can greatly affect many people in need and many useless "medical knowledge" will spread [6].

COVID-19 origin hypotheses

Background

In the past discovery, wild animals, such as bats, snakes and others are most attributed for this virus outbreak (zoonotic arguments) from public opinions and most normal people interests. Same situation is commonly met for other viral disease outbreak and pandemic

worldwide [7-9]. The incidence of infectious people did not reduce rapidly. Other risk factors may also be possible. These obstacles will be reviewed and lifted if needed.

Epidemic control policy and dilemma

Despite many arguments for zoonotic infection as a potential viral origin, we do not recommend for killing all wild or domestic animals for cutting off the sources of viral spread. This is a suicide action because wild or domestic animals are very helpful for human beings for providing high-quality proteins, lipids and recreation. Detail biological or viral infectivity study and phylogenic information must be systematically promoted for inviting more mature governmental policies and financially sustainable management activity and systems.

Different pattern of epidemic managements

Transmission prevention

Viral transmission prevention plays a key role for the managements of coronavirus pandemic and epidemics. Table 1 and figure show parts of these preventive conventions for individual persons (Table 1 and figure).

Wear masks
Social distancing
Out-door activity reduction
Mass aggregation limitation
Reduce the events of going into restaurants, cinema and theaters

Table 1: Personal obligations during the pandemic.

Life-style adjustment

Life-style adjustment may be an avenue for human benefiting and spread limitations, such as

- Washing hand frequently
- Indoor exercises
- Stop alcoholic behaviors.

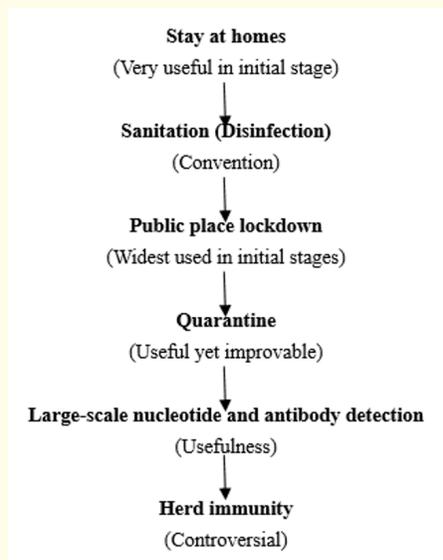


Figure 1: Public efforts for COVID-19 contains.

Insights

Many preventive measures and systems face with resistance, uncertainty and challenge. In this short period of time, we cannot give 100% scientific recommendation. Many preventive measures are useful but damage to personal interests and freedom. Some of preventive measures, such as herd immunity may face ethic debates and outcome uncertainty. More mature new preventive measures may be designed for overcoming past preventive strategy shortage and economic damage in the future.

Human therapeutic development

Key factors

Vaccine development is always the sweet-heart of global virologists and medical doctors against new virus epidemic outbreak because it is easy to handle in the clinic and theoretically “non-toxic” for utility. Is it really so easy? The vaccine study and development for COVID-19 have been underway in many countries. It may be effective in the future. However, some economic and ethical issues must be transcended before massive manufacture and pharmaceutically licensing. Any vaccines for deadly viruses may have harmful possibility despite many clinical successes [10-18]. Gradual progress for vaccine risk and toxicity evaluation may be more suitable at current stage.

Therapeutic systems in Western countries

Due to the newly emerged virus of COVID-19, the greatest shortage of drugs, techniques and devise is present. This world has no licensed drugs against COVID-19 infection, especially medical drugs in west countries. In west pharmaceutical system, drug licensed may last at least two years. Thus, doctors have to use a number of anti-viral drugs against other viral diseases. Nonetheless, most anti-viral drugs have many undesired side-effects, such as blood, neural and cardiovascular when over-uses. As a result, the drug dose control is indispensable. They contain administration route selection, genetic variants of drug metabolic enzymes in individual patients and others (modern chromatography or capillary electrophoresis).

East therapeutic strategies and systems

The infectious patients in eastern countries may face different forms of therapeutic strategies. In China and India, there is a good preparedness for herbal medicine [19,20]. Although they are not practiced in western countries, Chinese doctors often prescribe approximately half of medication with fixed forms of pharmaceutical herbal products. This custom still remains in China.

Outlook of available therapeutic options in the clinic

Currently, some therapeutic options and strategies show promising outcomes and benefiting in the clinic.

Plasma therapy: The plasma from viral recovered patients is the known therapeutics for patients at critical stages and medical conditions [21,22]. Wide-scale clinical evaluation may help doctors to transform such therapeutic attempts into therapeutic paradigms and save the life of more patients at critical conditions.

Retroviral or protease inhibitors and drugs: Antiviral or antimicrobial against other types of viruses or microbial such as malaria and others is used in the clinic worldwide. Currently, Remdesivir, favipiravir and arbidol as are widely used for COVID-19 infection in China [23-25]. In addition, chloroquine is reported to be useful for viral cellular entry in western countries [26]. However, there is no decisive drug for critical conditions in this epidemic stages and areas.

Anti-inflammatory agents: Anti-inflammatory agents are widely used as symptom alleviation. They are not viral killers. Thus, carefully evaluating and comparison of their actions in clinical trials is indispensable, especially drug combination. However, their clinical utility for disease progress reversal is positive in broad-ranges. Further scientific work is needed.

Traditional chinese medicine (TCM) [27-34]

Preventive measures: Some forms of commercial herbal powders and balls have been licensed for viral or microbial infection prevention and treatments {most famous powder like 板蓝根冲剂 water dissolving ban-lan-gen (*Radix isatidis*) powders and others}.

Formed herbal pharmaceuticals: Formed herbal pharmaceuticals are very popular for different categories of human infections (fever, nose fluid, cough, headache, respiratory difficult and many other others). They are 牛黄解毒片 (detoxicating tablet of cow-bezoar, Niu-huang-jie-du-pian), 柴胡冲剂 Chai-hu-chong-ji (*Radix bupleuri*), 上清饮口服液 (Shang-qing-ying fluids) and many others. They are cheaper than licensed drugs in developed countries.

Herbal medicine for individuals: Herbal medicine for individual patients required a certain of medical experience because prescription of herbal medicine is a complicate one [28]. Adding, deleting and dosing different herbs based on some classic fixed receipts date back to ancient famous doctors are widely practiced in China. We do not give further information due to space limitation.

Patients with underlying diseases

Patients with underlying diseases, such as obesity, type 2 diabetes and cardiovascular [35-42] are usually more difficult to recover from acute viral infections, surgery or other emergency treatments. At this stage of coronavirus pandemic, there is an urgent requirement for clarifying if there is an association between coronavirus infected patients and other underlying diseases.

Types	Mechanisms and pathways
Drugs	Antiviral (Viral proliferation, viral-host-interaction) Symptom alleviation Whole body moderation
Vaccines	Prophylactic (emphasized on safety) Treatments (emphasized on efficacy)
Diagnostics	Viral (load, sequence, replication, moderation and cell-cycle) Antibody and immune response (interleukin) Pulmonary damage and overall images Blood tests (different components and lymphatic cells) Underlying diseases Biomarkers (inflammatory, viral cellular entry and replication)
Foods	Nutritional (immune stimulation and normal physiological function) Supplementary (vitamin, mineral and trace elements)
Devises	Ventilators Thermometers Masks Sanitation devises
Drug toxicology and doses	Drug dose optimizing in patients Avoid unnecessary or toxic drug treatments Pharmacogenomics
Herbal medicine	Preventive Fixed products (either slight or severe cases) Prescript for individual patients
Nursery	Psychological support Physical supportive Food providers Palliative treatments Patient’s condition monitors

Table 2: Medical intervention and therapeutics against COVID-19.

Future direction

Etiological and pathologic study

Finding out pathological models by different strains of coronaviruses or other associated viruses infection is very meaningful because there is a variety of infectious virus in the world. Comparison and validity of different viral strains to establish infectious animal models is indispensable for future drug evaluation, knowledge developments, clinical assessments and therapeutic strategy hospitalization.

Human genomic study

Human genomic study is very useful for viral infection in human bodies [43-47]. There are many pathological pathways associated with disease progress and human mortality. However, there is little medical information for COVID-19 infection and treatment until now.

New drug development pipelines

Currently, there is no specific drug highly effective against COVID-19 treatments and life-saving worldwide. It is very important to design and evaluate different types of effective anti-COVID-19 agents and drugs. Certainly, it needs to be based on pathological knowledge and pharmacological study. Useful animal and human cell models (*in vitro*, *in vivo* and *in silico* models) are indispensable.

Apart from conventional biomedical study, computational analysis and drug design for COVID-19 is also supportive for knowledge enlighten and targetable discovery [48-52]. Following molecules may be testified for drug screening and targeting:

- Human angiotensin converting enzymes (hACE2)
- Proteases (PL pro, 3CL pro and others)
- RNA-dependent RNA polymerase (RdRp)
- Helicase
- N7 methyltransferase
- Human dipeptidyl peptidase IV (DDP4)
- Receptor-binding domain (RBD)
- Type-II transmembrane serine protease.

Drug combination study

To many deadly viruses, such as HIV infection and cancers, drug combination plays key roles for therapeutic outcome promotion. However, the basic therapeutic study for drug combination needs tricky and persistent efforts of both experimental and clinical [53-55].

Hypotheses verification

A lot of biomedical hypotheses associated with COVID-19 were proposed-origin, different lineage and pathogenesis. To prove these hypotheses, governmental funding should be better allocated for achieving the greatest biomedical benefits in the future. If some hypotheses are proved, high quality viral control will be realized. This is not a pure scientific topic. It has a lot of social significance.

Conclusion

The COVID-19 pandemic is not over so far. Thus, we have to keep pushing for medical knowledge enrichments and creating more effective management systems for cutting off the pandemic as soon as possible. This article tries to do this task and provides information usefulness. Look forward to the success of this battle.

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Conflict of Interests

None.

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