

Curcumin vs Chloroquine in Coronavirus Global Pandemic: Trend analysis Study in Google

Maslichah Mafruchati

Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Universitas Airlangga, Mulyorejo, Kampus C Unair, Surabaya, 60115, Indonesia

Abstract

COVID-19 is an infectious disease caused by the newly discovered corona virus. Curcumin and Chloroquine are one of the medications to combat against the pandemic. This paper has objective to analyze the trends inside the use of Chloroquine and Curcumin as medical treatment against corona in global big data. This study uses quantitative method of data mining design in collecting the data. This study uses simple random sampling to determine the number of the population needed for this study. This study uses Google trends to gather the statistical result based on the keyword. The result shows that curcumin is more popular to be searched as information in bigdata. USA is the country with the biggest demand of information about curcumin, as seen on the number of queries variation as well as the relevance score. It can be concluded that information about curcumin has demanded more because of low side effect than chloroquine.

Keywords: *Chloroquine, curcumin, coronavirus, Google Trends*

Background

COVID-19 is an infectious disease caused by the newly discovered corona virus. Most of the patients who are the container of the COVID-19 virus will show the symptom from light to moderate respiratory illness and need special care. Moreover, this virus is more vulnerable to attack Elderly people who are older than 60 years and have basic medical problems such as cardiovascular disease, diabetes, chronic respiratory illnesses, and cancer ¹. The case of COVID-19 is also called the severe acute respiratory syndrome Corona Virus 2 (SARS CoV-2). This is a new type of corona virus that has not been previously identified in human body ².

The vaccine to combat for this outbreak is currently under developed by experts of medical world across the globe. However, it is estimated that the vaccine will only be completed next year. Vaccines are antigenic substances used to produce immunity to a disease ³. To resolve this problem, drug testing is being carried out, and one of them is Chloroquine. Chloroquine phosphate is a drug for treating malarial and Amebicides. This drug has been used to prevent and treat malaria for around 70 years ⁴. President of USA, Donald J Trump states that the drug had been used and showed satisfactory results. He also mentioned that the US Food and Drug Administration (FDA) have approved the use of chloroquine. Moreover, he said that the drug may circulate with a doctor's prescription ⁵.

Another medicine to treat the symptom is curcuma. Curcuma is a natural antioxidant and anti-inflammatory agent that can help increase cell resistance to damage, infection, inflammation, and prevent some degenerative diseases. Curcumin substance in curcuma is very good for consumption every day, to improve the body's immune system, especially for people who are active every day ⁶. Curcumin has many health benefits for the body. In addition to overcoming the problems of the digestive

Corresponding author:

Maslichah Mafruchati

Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Universitas Airlangga, Mulyorejo, Kampus C Unair, Surabaya, 60115, Indonesia,

+6281231783999, maslichah_m@fkh.unair.ac.id

system, ginger can also be an anti-inflammatory drug and wound healer. This plant can also prevent cancer, as an antibacterial and antifungal, and maintain liver health. This herb is safe for consumption on a regular basis, because it is able to maintain the immunity system of the body⁷.

The fourth industrial revolution has been changing the medical system and workplace. Albeit most of the data in the health service sector is currently stored in print, the trend towards digitalization is happening fast⁸. The emergence of many standards, regulations and incentives for digitizing data and sharing data in the health sector, and reducing the cost of data storage and processing technology are the sign of digital revolution in medical world. When the covid-19 outbreak began at 2019, AI and big data were calculated the scope of the outbreak and the number of victims⁹.

AI and big data technology have been used in many hospitals in many provinces and cities, and continues to be applied in more hospitals throughout China. AI and big data also recorded the most frequent use of drug and herb for medication treatment of this outbreak¹¹. Based on the background above, this study has purpose to observe the trends inside the use of Chloroquine and Curcumin as medical treatment against corona in global big data. The theoretical implication of this study is to persuade society to learn more about big data to treat symptom caused by Covid-19.

Method of the Study

This study uses quantitative method of data mining design in collecting the data. This study uses simple random sampling to determine the number of the population needed for this study. This study uses Google trends to gather the statistical result based on the keyword. The inclusion criteria of the sample are the country with high number of death and active cases frequently uses either Chloroquine or Curcumin as medication treatment, and modern country using big data in medical treatment¹².

There are 3 samples of this study based on the keywords typed in Google Trends, which are *chloroquine*

and *curcumin*, USA, UK, and Italy. The period of the observation is December 2019 to March 2020 when the outbreak started actively across the globe. The statistical data are related queries of those two keywords in three countries. The data are measured the occurrence and relevance score based on how many the information available during that period¹³.

Occurrence score shows how many the keywords appeared in the data, while relevance score based on how relevant some information with the keywords that are being observed. The relevance score measured from 1 to 10 from the scale. Data is downloaded in CSV file from Google trends. Data analysis was performed using Vosviewer version 1.6.14 for windows¹⁴.

Result of the Study

Table 1 The relevance and occurrence point of Curcumin in USA bigdata

Term	Occurences	Relevance
Benefit	1	4.00
Best curcumin supplement	1	4.00
Breakout	2	4.00
Curcumin	4	4.00
curcumin3	1	4.00
Ginger	1	4.00
Turmeric curcumin	2	4.00
United States	1	4.00

Table above shows that curcumin information is quite popular in USA. There are various of related queries about curcumin, when the outbreak is happened. There are 8 queries that has relevance score 4.00 means that some information about curcumin is not really connected to each other. It can be seen from the table above that although there are many queries contains information about curcumin, the relevance score are low or has no relevance at all.

Table 2 The relevance and occurrence point of Chloroquine in USA big data

Term	Occurrences	Relevance
Chloroquine phosphate breakout	1	6.05
Chloroquine phosphate1	1	6.05
Couple	2	6.05
Breakout	3	3.71
Chloroquine phosphate	7	3.71
Sale	1	3.71
United States	1	3.71

Table above shows that the information search of chloroquine has higher relevance point than curcumin. The information about chloroquine phosphate in breakout has highest relevance point because the high usage of chloroquine in medical treatment in hospital. There are 3 queries related to the usage of chloroquine has relevance point higher than 6 and 4 queries has higher than 3. USA seems more believe in chloroquine phosphate rather than curcumin in treating the outbreak.

Table 3 The relevance and occurrence point of Curcumin in Italy big data

Term	Occurrences	Relevance
Curcumin	2	3.50
Italy	1	3.50

Table above shows that information search about curcumin is really low in Italy. Table above also shows that there is a variant of curcumin usage such as curcuma piperina or curcumin powder. It means that the extract from curcumin is dried into powder to prolong the expiration date.

Table 4 The relevance and occurrence point of Chloroquine in Italy big data

Term	Occurrences	Relevance
Chloroquine phosphate	1	3.00
Italy	1	3.00

Table above shows that the information search of chloroquine also low both in varieties as well as the frequency in Italy. It is similar with curcumin, there is only few people interested in chloroquine as the way to fight the covid 19 pandemic. There are only 6 varieties

of queries related to chloroquine, fewer than curcumin. The relevance score of information is also lower too than curcumin. It can be concluded that Italian are not really care to figure out the best way to cope with the pandemic.

Table 5 The relevance and occurrence point of Curcumin in UK bigdata

Term	Occurences	Relevance
Barret	1	3.83
Benefit	1	3.83
Curcumin	2	3.83
Curcumin3	1	3.83
Holland	1	3.83
United Kingdom	1	3.83

Table above shows that there is a high demand of information about curcumin in UK. It can be seen that there are many queries related to curcumin. There are 18 queries related to curcumin, 4 of them are the varieties of curcumin product such as tablet, vapsule, powder, and supplement. There is also curcumin information about side effect to know the negative side of this substance. The highest relevance score is 3.83 with more than 6 queries.

Table 6 The relevance and occurrence point of Chloroquine in UK big data

Term	Occurences	Relevance
Chloroquine phosphate	1	4.0
United Kingdom	1	4.0

Table above shows that chloroquine information is not as popular as curcumin. There are only 8 queries but the highest relevance score is 4.00, a bit higher than curcumin. It can be concluded that information about chloroquine is less popular than curcumin.

Discusssion of the Result

Based on the result above, it can be concluded that curcumin is more popular to be searched as information in bigdata. USA is the country with the biggest demand of information about curcumin, as seen on the number of queries variation as well as the relevance score. United States of America the biggest number of covid-19 suspect than the rest of the world. As a result, the demand of information about the medicine for covid-19 is also high.

Study by Mounce et al states that curcumin preserve the liver by stopping myocardial fibrosis through modulation of the renin-angiotensin enzyme system and increasing ACE2 pressure which can help repair fibrosis that cannot be tolerated to use ACEis drugs. Curcumin also has effect of inhibiting the process of viral growth, both directly by damaging the physical

virus and by suppressing cellular signaling pathways that are important in the process of virus replication⁶.

Curcumin is a polyphenol compound which can befound in turmeric and ginger. Curcumin is also contained in several species of Curcuma from the Zingiberaceae family Curcumin has a yellow color cannot be dissolved easily in water but, in organic solvents. Curcumin is non toxic to normal cells and very efficacious in the treatment of cancer therapy. Thus it can become as an antioxidantgood because of its phenolic compounds which acts as an antioxidant and inhibitor melanogenesis¹⁵.

Tables above shows that the demand of information about curcumin in USA bigdata is a bit lesser than chloroquine. One of the reason because Food and Drug Administration in USA has been permitted in using hcloroquine and hydroxychloroquine as the medication

against coronavirus. Moreover, President Trump pushed for federal bureaucracy to cut through bureaucracy and move faster to find ways to combat the COVID-19 virus. Trump said he wanted to speed up vaccine approval and treatment to combat the COVID-19 pandemic¹⁶. Trump claims, the US Food and Drug Administration (FDA) has approved the use of chloroquine for the treatment of corona patients. Trump expressed his appreciation for the drug chloroquine which calls it a potential game-changer drug, while apparently stumbling on the regulatory pathway needed to give it to a wider set of patients¹⁷.

Chloroquine is a drug used to prevent or treat malaria. The drug is also used to treat autoimmune disorders, rheumatoid arthritis and lupus. It is also used to treat amebiasis or parasitic infections of *Entamoeba histolytica* (*E. histolytica*) in human intestine. But there is also a risk of using this anti-malaria drug to treat patients with COVID-19, a disease that attacks the respiratory system¹⁸. Side effects ranging from mild such as headaches, stomach cramps, and nausea, to severe ones, namely heart rhythm disorders. In some cases, administration of chloroquine phosphate can cause QT intervals to elongate at which the heart rhythm becomes abnormal¹⁹.

Tables above show that Italy is the country with least demand of information about curcumin and chloroquine. Different from Italy, UK has bigger demand of information about curcumin. Moreover, the number of varieties of queries and relevance point of curcumin are far higher than information about chloroquine. Thus, there is also some of the derivative product of curcumin for public, while chloroquine only has one.

Mounce et al state that curcumin natural supplements are as effective as drugs, such as antidepressants and without significant side effects to the body⁶. Antidepressants which is consumed for a long time can cause a chronic disease, while curcumin is very safe and there is no toxicity, even when you consume curcumin up to 12 grams a day for six months, it has no toxicity⁷. In the global pandemic where people must isolate themselves at home as a result of lockdown, antidepressants tend to be used against solitude feeling and depression. Moreover, the massive loss of job and lack of food supply also causes massive depression in

society which led to the usage of antidepressants to calm down the mind¹.

Conclusion

Based on the result above, it can be concluded that the demand of information of curcumin is higher than chloroquine in UK and Italy, while USA as a result of bureaucracy emphasizes on the use of chloroquine more than curcumin to cope against the global pandemic. USA has the highest demand of information either in curcumin or chloroquine. Italy has the least information demand about both of the medication. Curcumin has demanded more because of low side effect than chloroquine. Moreover, curcumin which has effect as strong as antidepressant without significant side effect really helpful for people who are isolated themselves because of the lockdown.

Ethical Clearance : This research does not involve any participants. Instead it is used big data as subject of research that was accordant with the principle of research ethic in collecting the data. The paper has never been submitted in anyone else and declared as original paper. The paper is free from any plagiarism and maintain the high standard of research ethic.

Conflict of Interest: The author hereby declares that there is no conflict of interest so far the study has been conducted.

Source of the Funding source: The author states that the funding of article processing charge will be paid by the university. All of the expenses while doing research project is paid by author's funds.

References

1. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5):1729.
2. Linton NM, Kobayashi T, Yang Y, Hayashi K, Akhmetzhanov AR, Jung S, et al. Incubation period and other epidemiological characteristics of 2019 novel coronavirus infections with right truncation: a statistical analysis of publicly available case data. *J Clin Med*. 2020;9(2):538.

3. Maggioli MF, Palmer M V, Thacker TC, Vordermeier HM, McGill JL, Whelan AO, et al. Increased TNF- α /IFN- γ /IL-2 and decreased TNF- α /IFN- γ production by central memory T cells are associated with protective responses against bovine tuberculosis following BCG vaccination. *Front Immunol.* 2016;7:421.
4. Lee JH, Chung W-B, Kang JH, Kim HW, Kim JJ, Kim JH, et al. A case of chloroquine-induced cardiomyopathy that presented as sick sinus syndrome. *Korean Circ J.* 2010;40(11):604–8.
5. Lopez-Ruiz N, Uribe CE. Chloroquine cardiomyopathy: beyond ocular adverse effects. *Case Reports.* 2014;2014:bcr2014205751.
6. Mounce BC, Cesaro T, Carrau L, Vallet T, Vignuzzi M. Curcumin inhibits Zika and chikungunya virus infection by inhibiting cell binding. *Antiviral Res.* 2017;142:148–57.
7. Katasonov AB. Curcumin as an ajuvant treatment of depression: mechanisms of action and application prospects. *Zhurnal Nevrol i Psikhiatrii Im SS Korsakova.* 2020;120(2):125–31.
8. Suyanto B, Subiakto H, Srimulyo K. Data of the patterns of youth local brand product consumption through online shopping. *Data Br.* 2019;23:103723.
9. Lee S-Y, Yoon H-J. A Study on Big Data Information System based on Artificial Intelligence-Filmmaker and Focusing on Movie case analysis of 10 million Viewers. *J Korea Inst Electron Commun Sci.* 2019;14(2):377–88.
10. Latif F, Bashir MF, Komal B. Role of electronic media in mitigating the psychological impacts of novel coronavirus (COVID-19). *Psychiatry Res.* 2020;113041.
11. Leung CK-S. Big data analysis and mining. In: *Advanced Methodologies and Technologies in Network Architecture, Mobile Computing, and Data Analytics.* IGI Global; 2019. p. 15–27.
12. Pahlevi R, Putra ST, Sriyono S. Psychoneuroimmunology Approach to Improve Recovery Motivation, Decrease Cortisol and Blood Glucose of DM Type 2 Patients with Dhikr Therapy. *J Ners.* 2017;12(1):60–5.
13. Wardhana AK. Information search trends about sharia: a comparison study between business-industry genre with book-literature genre. *J Halal Prod Res.* 2020;3(1):35–42.
14. Suardana IW, Yusuf A, Purnomo W. Self-Help Group Therapy: The Enhancement of Self-Care Ability and Quality of Life Among the Elderly in Bali, Indonesia. *Indian J Public Heal Res Dev.* 2018;9(11).
15. Colpitts CC, Schang LM, Rachmawati H, Frentzen A, Pfaender S, Behrendt P, et al. Turmeric curcumin inhibits entry of all hepatitis C virus genotypes into human liver cells. *Gut.* 2014;63(7):1137–49.
16. Zenko M. The Coronavirus Is the Worst Intelligence Failure in US History. *Foreign Policy.* 2020;25(03).
17. Yamey G, Gonsalves G. Donald Trump: a political determinant of covid-19. *British Medical Journal Publishing Group;* 2020.
18. Chatre C, Roubille F, Vernhet H, Jorgensen C, Pers Y-M. Cardiac complications attributed to chloroquine and hydroxychloroquine: a systematic review of the literature. *Drug Saf.* 2018;41(10):919–31.
19. Yogasundaram H, Hung W, Paterson ID, Sergi C, Oudit GY. Chloroquine-induced cardiomyopathy: A reversible cause of heart failure. *ESC Hear Fail.* 2018;5(3):372–5.