

## The Application of Vitamin C and Aspirin Therapy is the Crucial for Patients Fall Sick from Coronavirus (COVID-19) to Survive

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### Abstract

In our study we investigated the effect of application of vitamin C and aspirin therapy for the surviving of patients with Coronavirus disease (COVID-19). 796 patients (male, 54.3%; mean, 61.3 years old) who had positive the chain reaction genetic test real-time with reverse transcriptase (rRT-PCR test) and who had at least three symptoms characteristic of patients with COVID-19 were allocated in two groups. During twenty-six days, investigated group of 398 patients (patients who had sputum expectoration and at least two more symptoms characteristic of patients with COVID-19) took vitamin C and aspirin like a therapy for COVID-19. In twenty-six days with therapy in this group dead 5 patients. Our control group had 398 patients (patients who had myalgia like one of symptoms characteristic of patients with COVID-19 and at least two symptoms more) who used only aspirin per day. In control group dead 29 patients during of twenty-six days of therapy. All patients, 762 who the rest are alive from both of investigated groups made again the rRT-PCR test on the twenty seventh day and no one did not have positive rRT-PCR test. In this study exist statistically significant correlation between COVID-19 surviving and using of vitamin C and aspirin like a therapy for COVID-19 ( $\chi^2=2.697$ ;  $p > 0.05$ ).

**Keywords:** Coronavirus; Survivors of the Corona Virus; The Chain Reaction Genetic Test Real-Time with Reverse Transcriptase (rRT-PCR test); Vitamin C and Aspirin Therapy

### Introduction

Phylogenetic analyzes show that SARS-CoV-2 is genetically distinct from Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV), which previously caused two waves of epidemics in the world. Analyzes of comparative studies have shown that these viruses have similar parts of the receptor that bind to angiotensin-converting enzyme 2 (ACE2) (SARS-CoV/SARS-CoV-2) or CD26 (MERS/SARS-CoV-2) [1,2].

The causative agent of the corona disease is the RNA coronavirus (COVID-19), which is more contagious to humans than SARS-CoV and MERS-CoV. The SARS-CoV-2 virus has a higher pandemic potential and its reproductive number (R0), which refers to the number of healthy people who become infected with a single SARS-CoV-2 carrier, is 2 - 2.5 [3].

Angiotensin-converting enzyme 2 (ACE2) is the primary receptor for the virus. Incubation time is ranging 1 - 14 days, mean 5.2 days. Elevated body temperature (in 83 - 95% of patients), dry cough (57 - 82%), malaise (29 - 69%), expectoration of sputum (26 - 33%),

dyspnea (18 - 55%), sore throat (5 - 17%), headache (13.6%), myalgia (14.8%), fever (11.4%), dizziness (9 - 12%), confusion (9%), rhinorrhea (4 - 5%), nasal congestion (4.8%), gastrointestinal symptoms such as diarrhea, nausea and vomiting (1 - 10%), hemoptysis (1 - 5%) and conjunctival congestion (0.8%) are the most common symptoms of COVID-19 [4-14].

The primary receptor for the virus in humans is ACE2, for whom binds a special spike (S) protein of the viral envelope. S glycoprotein before binding to ACE2 is degraded by human proteolytic enzyme furin which is important for increased portability and pathogenicity of SARS-CoV-2 virus [15]. In the lungs, heart, esophagus, distal part of the small intestine due, kidneys and bladder exists high density ACE2 which is reason for the virus the most common bind to these organs [16]. Spike protein of SARS-CoV-2 virus has a special site for N- and O-linked glycosylation and its S part can affect the CD26 antigen human cells, which may further enhance virulence [4].

“Gold” diagnostic standard is chain reaction genetic test real-time with reverse transcriptase (rRT-PCR).

Many COVID-19 patients develop acute respiratory distress syndrome (ARDS), which leads to pulmonary edema and lung failure, and have liver, heart, and kidney damages [7,17]. These symptoms are associated with a cytokine storm, manifesting elevated serum levels of IL-1 $\beta$ , IL-2, IL-7, IL-8, IL-9, IL-10, IL-17, G-CSF, GM-CSF, IFN $\gamma$ , TNF $\alpha$ , IP10, MCP1, MIP1A and MIP1B [7].

In addition to extreme inflammation in our inflammatory cells, the coronavirus causes a large production of free radicals whose are mediators of various damages in different organs. Free radicals are molecules that damage our proteins and thus cause oxidative stress.

COVID-19 duration varies and in hospitalized patients it is estimated to be 16 - 26 days (interquartile range 12-29 days). World Health Organization reports a 2 percentage global mortality rate or 15,000,000 patients who have died from COVID-19 across the planet.

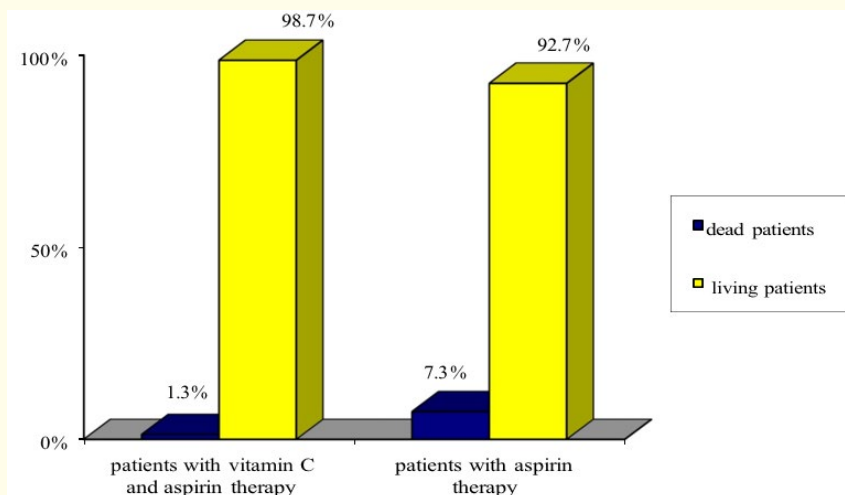
Specific prophylaxis of COVID-19 with drugs does not yet exist. Considering how the coronavirus causes the disease, it is very important to take care of the immune system, which should be strong and functioning properly. When the clinical trial phases were completed, new drugs began to be used: remdesivir, nafamostat, favipiravir and several others. After seven vaccines against SARS-CoV-2 whose administration started three years ago, were developed a large number of different vaccines and their administration continue to this day.

### Methods

In our research, we analyzed the influence of therapy with vitamin C and aspirin on surviving of 796 patients fall sick from Coronavirus (COVID-19). All patients in both of investigated groups had positive rRT-PCR test and they had at least three symptoms characteristic of patients with COVID-19: dizziness, confusion, headache, malaise, myalgia and arthralgia, fever, sore throat, dry cough, sputum expectoration, dyspnea, hemoptysis or conjunctival congestion, nasal congestion, rhinorrhea, gastrointestinal symptoms such as nausea, vomiting and diarrhea. Our patients we investigated at the Department of General Surgery in Belgrade in the period from 1<sup>st</sup> December 2020 to 11<sup>th</sup> December 2023. Every patient took his therapy in period of twenty-six days at home. Our research we organized like a prospective study. Investigated patients were divided in two groups. In first group were patients who had positive rRT-PCR test and who had sputum expectoration and at least two more symptoms characteristic of COVID19 patients. In that group 398 patients like a therapy took vitamin C and aspirin. Patients used one 500 mg tablet of vitamin C four time per day. First tablet of vitamin C every patient took at 8 a.m., second tablet in 12 a.m., third tablet at 4 p.m. and the last fourth daily tablet in 8 p.m. All patients from this group also took one 500 mg tablet of aspirin every evening at 7 p.m. One 500 mg tablet of aspirin every evening at 7 p.m. used every patient from control group with 398 patients with positive rRT-PCR test and who had myalgia and at least two more symptoms characteristic of COVID-19 patients. After twenty-six days of therapy, every patient made the rRT-PCR on the twenty seventh day again. The statistical sample size is determined by the statistical methodology to meet the basic principle of representativeness in our study and results are presented in graphic. In our investigation we used parametric test (Student's t-test) and nonparametric Chi-square test for statistical analysis. We used the software package SPSS 14.0, and the imaging table and a Microsoft Office Word 2007 in statistical analysis.

### Research Results

In our study we investigated 796 patients. From them 398 used vitamin C and aspirin like a therapy for COVID-19 or 50.0% and 398 patients used only aspirin for therapy of COVID-19. Between taking of vitamin C and aspirin therapy for patients fall sick from Coronavirus COVID-19 and their surviving in our study exist statistically significant correlation ( $\chi^2 = 2.697$ ;  $p > 0.05$ ). On twenty seventh day from starting therapy all 762 patients who were alive did not have positive rRT-PCR test. 5 patients or 1.3% from patients who used vitamin C and aspirin during twenty-six days were dead. 393 patients who used vitamin C and aspirin therapy were alive after twenty-six days of therapy or 98.7% patients. 369 patients who used only aspirin every evening of twenty-six days the rest are alive or 92.7% patients and 29 patients with aspirin therapy or 7.3% patients dead (Figure 1).



**Figure 1:** The influence of using of vitamin C and aspirin therapy on the surviving of patients with coronavirus disease (COVID-19).

### Discussion

Coronavirus disease (COVID-19) is a respiratory infection, primarily transmitted by droplets and close contact with a diseased person.

According to World meter data, 6 954 105 people have died from the COVID-19 outbreak so far as of December 11, 2023 at 12:16 GMT. There are currently 699 231 816 confirmed cases in 229 countries and territories. The death rate is still being estimated.

Acute liver damage (in 14 - 53% fall sick from Coronavirus), acute respiratory distress syndrome (15 - 29%), acute damage heart (7 - 19.7%), arrhythmias (16%), acute respiratory failure (8%), acute renal impairment (3 - 7%), secondary infections (6.1-10%), sepsis (2 - 8%), pneumothorax (2%), acute cardiac insufficiency (1%) and disseminated intravascular coagulation (1%) are complication whose occurs in patients with COVID-19 [17-27].

In our study we had 437 (54.9%) patients with acute liver damage, 199 (25%) patients with acute respiratory distress syndrome, 136 (24.6%) patients with acute damage heart, 105 patients or 13.2% with arrhythmias, 10.9% or 87 patients with acute respiratory failure, 69 (8.7%), patients with acute renal impairment, 56 (7%) patients with secondary infections and 0.7% or 6 patients with acute cardiac insufficiency. Comparing the percentages of complications in patients with coronavirus disease in the aforementioned world studies with the percentages of complications in patients with coronavirus in our investigation, we conclude that the results are very similar.

More free radicals are created if we are exposed to high concentrations of tobacco smoke, but also if we are exposed to a coronavirus infection. Increased production of free radicals and oxidative stress are present in chronic noninfectious diseases such as malignancies and cardio-vascular diseases, therefore there is a clear connection between these diseases and the acquisition of severe forms of coronavirus. Defense mechanisms differ from person to person due to the fact that small variations in genes have occurred during evolution, so that different people have different capacity to defend against free radicals that need to be neutralized.

Vitamin C is a very strong antioxidant and has an anti-inflammatory effect. In addition to affecting cellular immunity, it also affects capillary permeability. As an antioxidant, the vitamin C might help protect cells from damage by chemical free radicals. Vitamin C reduce endothelial dysfunction, managing hypertension, reducing cardiovascular disease risk and preventing stroke. It has a beneficial effect on patients with diabetes, certain types of cancer, gout and Alzheimer's disease.

Scientists are skeptical about the use of antioxidant vitamins when we are completely healthy, when we have a balanced diet. In such situations, taking antioxidant vitamins can be very dangerous.

However, there are patients in intensive care who have unmeasurable amounts of vitamin C and therefore this is a real situation in which intervention with antioxidant vitamin C is needed.

In a study in the scientific journal *JAMA*, it was pointed out that the use of vitamin C in septic patients in intensive care, who have lung damage with acute respiratory distress syndrome reduces the risk of death by approximately 30% [28].

Also, in a study of 50 moderately severe COVID-19 patients in Shanghai, China, no patients who were treated with high-dose vitamin C died [29].

Aspirin contains acetylsalicylic which is an analgesic (relieves pain) and antipyretic (reduces elevated body temperature).

Aspirin is taken for the symptomatic treatment of elevated body temperature and/or mild to moderate fever, pain such as headache, flu-like syndrome, toothache, muscle pain, and also thin the blood and prevent blood clotting (anticoagulant).

In our study 98.7% patients were alive on the twenty-seventh day from the beginning of therapy by vitamin C and aspirin. Our research showed statistically significant correlation between COVID-19 and application of vitamin C and aspirin therapy for COVID-19 ( $\chi^2 = 2.697$ ;  $p > 0.05$ ). In our investigation, we had 1.3 percentage of patients who died from the coronavirus with vitamin C and aspirin therapy. This is a better survival rate for patients suffering from the coronavirus (COVID-19) than the world data. World Health Organization reports of more than 2 percentage of global mortality.

The entire mechanism of the effect of vitamin C and aspirin therapy is not completely understood, but their application is crucial for patients suffering from the corona virus (COVID-19) to survive.

### Conclusion

The use of vitamin C and aspirin is a simple and inexpensive therapy. Our study showed that the administration of vitamin C and aspirin can increase the survival of patients with the corona virus (COVID-19).

A large number of universities, private research laboratories and biotech companies have been working to overcome this pandemic. New knowledge will help to better understand viral infections and prevent a disaster like this from happening again. The leaps in findings gained in our research and the experience from practice should be the guide for the future.

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