

GIT & Liver consequences in COVID-19 and its vaccines—efficacy, safety & hesitancy: a review

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Abstract: Since the end of year 2019, whole world is struggling with the epidemic of the century, the Corona Virus Disease 2019 (COVID-19). Millions of people around the globe have been affected by this contagious virus; many even lost their battle against it. This deadly virus majorly affects our pulmonary system followed by other organs like gastrointestinal tract (GIT), liver, heart, central nervous system (CNS) and other tissues; consequences of which in many cases is death. Our health experts worked day and night to find the weapon that could save human race from this deadly virus and they succeeded in no time by inventing lifesaving vaccines against COVID-19, some of which are now approved by various health authorities around the world. But, for the first time vaccines are made in such short period of time, whereas, in normal course it takes years to invent a vaccine against any virus. Now, this arose many questions on the efficacy and safety of these newly made vaccines; which are the only way, till date, to put a halt in the disastrous path of COVID-19. Thus, worldwide studies are been done to collect the data regarding its efficacy and safety to encourage common people to get vaccinated soon. This article would give the readers a little overview regarding the same.

Key words: COVID-19, SARS-CoV-2, vaccine, safety, efficacy, GIT, liver.

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Abbreviations: COVID-19, Corona Virus Disease 2019; GIT, gastrointestinal tract; CNS, central nervous system; ACE2, angiotensin-converting enzyme 2; CDC, centres for disease control.

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Introduction

Current worldwide pandemic of COVID-19, or in simple layman language Corona, is attributed to SARS-CoV-2 that is, severe acute respiratory syndrome-2, is a highly contagious and deadly respiratory virus [1]. It belongs to the beta coronavirus family, and makes its entry in our body through the angiotensin-converting enzyme 2 (ACE2) receptor [2].

Corona virus 2019 was named as SARS-CoV-2 by International Virus Taxonomy Committee on 13th of Feb 2020. It is believed that the main mode of its spread is through respiratory droplets and close contact [3].

As Sars-CoV-2 enters any human body, it starts proliferating in the blood leading to occurrence of pneumonia followed by cold, cough, fever, fatigue, headache, diarrhoea and related co-occurring medical conditions [4].

Till date, it's unknown, if the virus itself is the main culprit of organ and tissue damage that has been seen in COVID-19 patients [5]. However, any organ in our body can be affected by this virus, in severely sick patients several organs can be affected together at a time. The virus binds to angiotensin converting enzyme 2 (ACE2) receptors that is found in the cells of various organs and tissues, in our body, damaging them directly [6].

Effects of COVID-19 on GIT and liver

It mainly attacks the respiratory system first followed by systemic spread to cardiac, hepatic and renal systems [5]. GIT symptoms can also be present in COVID-19 patients and these are more visible in patients with some serious illness along with COVID-19 rather than patients who are not seriously ill but are infected by COVID-19 [7]. Commonly seen GIT symptoms include nausea, vomiting, abdominal pain, diarrhoea, loss of appetite. In few, cases these symptoms can be present without any pulmonary symptoms. Positive stool test for COVID-19 virus suggested that it can make its entry into the human body through digestive system also, and that it can live and multiply in GIT too [8].

Moreover, according to a study, COVID-19 GIT test was found to be positive in some people without any visible GIT clinical symptom highlighting a quiet nature of this virus sometimes [9]. Many cases of COVID-19 presented with positive GIT COVID-19 test but negative pharyngeal /sputum test suggest for or-fecal route of this virus raising concerns regarding proper hand hygiene [10]. This also indicates that GIT testing for COVID-19 must also be performed before declaration of any individual as COVID-19 negative; also, if any patient visiting hospital or clinic, complains of diarrhoea, must also be considered as

might be positive for COVID-19 and thus, proper GIT testing for COVID-19 must be performed [4]. Although, drug induced diarrhoea is very common in COVID-19 patients due to high usage of antibacterial and antiviral drugs in COVID-19 treatment [3].

Reason for liver damage in COVID-19 infection might be presence of infection within cells of liver or it can also be drug intake during COVID-19 infection treatment. Inflammation can be caused by cytokine storm, also hypoxia related to pneumonia may cause it. Presence of this virus has been shown in liver cells, although the concentration being very less. Effect of COVID-19 infection in patients with several liver related diseases is still to be assessed [10] as mortality rate has been shown to be more in patients who already suffered with some liver disorder, mostly patients with cirrhosis. Also, levels of albumin in serum of COVID-19 patients, with liver problems, can be low, which is not at all appropriate condition for liver to function normally [2].

COVID-19 Vaccines

The COVID-19 pandemic is a worldwide challenge [11]. Disaster caused by this contagious virus raised a global scientific focus to the vaccine development to put a halt to its deadly speed [1]. In the absence of a vaccine against it, wearing masks, hand washing or sanitization, social distancing, tracing of COVID-19 contacts, if any, testing on large scale, are the most effective measures taken by all countries around the world. But, these approaches lead to social, emotional, and financial stress on common man; proving that development of a COVID-19 vaccine is the need of the hour [11]. However, for long lasting effect, the vaccine must be safe and highly effective in curbing the spread of this virus, along with the high level of acceptance for the vaccine in common mob must be present, so that the herd immunity can be achieved [12].

Whole world looked forward to the development of COVID-19 vaccines. Since, these vaccines are newly made, it lacks data regarding its long term safety and efficacy, which according to many studies is a major cause of non-acceptance for these vaccines [13].

Vaccines in line

Around, ninety-six COVID-19 vaccines are in line and are at different stages of development. At present, we have the interim results of four studies published in scientific journals (on the Pfizer–BioNTech BNT162b2 mRNA vaccine, the Moderna–US National Institutes of Health [NIH] mRNA-1273 vaccine, the AstraZeneca–Oxford ChAdOx1 nCov-19 vaccine, and the Gamaleya GamCovidVac [Sputnik V] vaccine) and three studies through the US Food and Drug Administration (FDA) briefing documents (on the Pfizer–BioNTech, Moderna–NIH, and Johnson & Johnson [J&J] Ad26. COV2.S vaccines) [14].

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Vaccine efficacy

Centres for disease control (CDC) defines vaccine efficacy as the differences between people who become sick following vaccination and those who become sick without receiving the vaccination. Efficacy is measured in phase III of a clinical trial. In this phase some people are vaccinated while others are given a placebo. Then, monitoring of both the groups is done for few months to check, if a reduced rate of infection is seen in the group that got the vaccine shot, comparative to the group receiving placebo [15]. It is referred to as relative risk reduction - RRR (table1) [14].

Table1. The efficacy of approved COVID-19 vaccines.

Approved COVID-19 Vaccines	Efficacy (%)
Pfizer	95
Moderna	94
Gamaleya	91
Jhonson & Jhonson	67
AstraZeneca	67

Vaccine safety

Some of the COVID-19 vaccines are well accepted by our immune system. Many studies have shown promising results related to these vaccines and that they are able to prevent virus infection, its rate of infection and can also lessen the number of fatalities; however, nothing is free and we need to pay some price for everything, not only financially, but number of side-effects and also deaths were recorded. According to recent data, around 4 deaths over 100,000 vaccine jabs is recorded in Europe (lareb.nl). Similar results are also shown by recently conducted analysis of the U.S. vaccine adverse reactions reporting system, recording 3.4 deaths per 100,000 vaccine shots, mostly with the Comirnaty (Pfizer) and Moderna vaccines [16].

Vaccine hesitancy

It can be described as the delay in acceptance, reluctance, or refusal of vaccination despite the availability of vaccination services. And has been enlisted amongst top 10 risks in 2019 to whole humankind by World Health Organization (WHO). It is caused by complicated decision making, the credit for which goes to so many factors life safety, efficacy, discussions at all levels, what and how the information is given, prior vaccination experience, and many more [17].

Five major individual-level factors of vaccine non-acceptance were illustrated by a research done in high-income countries and those are: confidence, complacency, convenience (or constraints), risk calculation, and collective responsibility. Collectively, it is named as 5 C model of the drivers of vaccine

hesitancy [18].

In many countries acceptance or willingness for vaccination was noted not to be high enough and this won't get improved until an active and well-organized vaccination programme is been run by governments at all levels; also, on top priority, cease all false information that is being circulated among common people that provokes doubt related to COVID-19 vaccines. Correct information should be conveyed at all levels, regarding approved vaccines that must be evidence based, and that, benefits of these vaccines are much more in comparison to the mere number of risks associated with them [19].

Effective strategies that could be implemented to convey correct and positive information to common people in relation to COVID-19 vaccines to build and boost up their confidence and ignore vaccine hesitancy [20]:

(1) Join hands with community organizations: There are various organizations that work on community level. These can be very helpful in spreading the correct information, regarding COVID-19 vaccines, to the people of the community as such organizations have leaders that are trusted by everyone, thus making it an effective way to communicate.

(2) Show confidence in people respected by community and make them as message conveyer: There are many leaders or celebrities which are respected and followed as an ideal by most of us. If such people show their confidence in these vaccines, through media or in public, would definitely encourage everyone to build up same confidence level in them too.

(3) Implicating easily reachable methods: Everyone around us is not necessarily privileged enough to have an access to internet or may not be able to attend community gatherings due to work and other responsibilities. For this group of people of our community special methods must be applied according to their ease, may it be face-to-face in person or some special event organized for such public.

(4) Don't be biased: All must be treated equally. Everyone has a right for information and to get vaccinated. Discrimination related to race, sex, colour, economic status must be totally avoided and these confidence building and vaccination programmes should be run at all levels with equilibrium.

(5) Give common people right to express: Common public should be given right to express and give feedback, which must be taken into account very seriously and problems faced, if any, must be resolved at the earliest to gain their confidence.

(6) Well-organized vaccination programme: A well-organized programme that is been running successfully imparts confidence in common man to trust the government. Thus, such flawless programmes are very important for a smooth process overall.

Discussion

SARS-CoV-2 is a highly contagious and a life-threatening infection that today the world is combating with [1-5]. This infection primarily affects the pulmonary system in human body. It can also affect other major systems, organs and tissues in the human body like cardiovascular system, gastrointestinal system, liver, central nervous system and can finally cause multiple organ failure leading to morbidity in many patients.

Thus, to save human race from this deadly disease our eminent scientists have invented various vaccines to fight this battle against COVID-19, which have been found highly effective and safe too [13-15]. But, now new challenges have evolved with the invention of these vaccines and they are to prove common man the safety and effectiveness of these vaccines, which have been made in very short period for the need of time, and encourage everyone to go get vaccinated soon to uproot the deadly virus of covid-19 [19,20].

This review article intimates about the effect of covid-19 on human body. It also includes the vaccines, which have been approved by authorities worldwide, that have been invented till date and the challenges faced by governments to make people of their country confident enough for these vaccines. It also illustrates the possible strategies that should be taken to make everyone feel safe and hopeful while getting a jab against COVID-19.

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