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Remdesivir break replication of virus & Rhodiola rosea acts same by enhancing immunity

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Acknowledge to the Idea Originator:

The idea is to analyse the University Centre of Planning ,Integration & Correlation with Center of Integrative Health & Medical Science and Faculty of Pharmaceutical Science, Faculty of Ayurvedic Science & Faculty of Homoeopathic Science , Jayoti Vidyapeeth Women's University, Jaipur jointly made efforts to identify Ayurveda and Homoeopathy Medicines for Corona Clinical Management with modern medicine . “Dr. Garg thoughts “Drugs formed by the same source or acts in different therapy pharmacopoeias which can be used as a single or with integrated approach to achieve better results”. “On the basis of same mode of antiviral activity. Remdesivir act directly on virus to stop multiplication & Rhodiola rosea act naturally enhance immunity against virus. This Hypothetical Theory base on the comparison of Comparative study of Remdesivir (RDV) and Rhodiola rosea in context of COVID- 19.Thats why in modern medicine produce some side effects but naturally occurring plant phytochemicals and their respective compounds naturally act on virus to prevent the multiplication and enhance the the immunomodulatory effect against the virus.

Abstract:

Remdesivir act directly on virus to stop multiplication against virus but the *Rhodiola rosea* act naturally to enhance immunity against virus replication. Remdesivir is an ATP analogue, which suppress the replication and multiplication process of viral genome. But remdesivir as a treatment is reported as risky for liver and kidney risks..Researchers found side effects with increased liver enzyme levels. Consequently there is a rapid require to look for secure medicine innovation and employ which don't have any side effects. *Rhodiola rosea* is can be a better alternative to curing viral diseases. It's well known antiviral agent and it can progress cellular immunity and humoral immune purpose. Remdesivir (RDV) is chemically different structure with *Rhodiola rosea* active compounds structures which are Salidroside and Rosarin.

Although, both Remdesivir (RDV) and *Rhodiola rosea* has similar antiviral activity. But according to this hypothetical research both Remdesivir (RDV) and *Rhodiola rosea* has similar antiviral activity without no any side effect but in the case of RDV reported the risk of liver disease so this hypothesis indicates Ayurvedic & Homeopathic medicine prepared by *Rhodiola rosea* for the cureness of covid-19 just because of RDV & Rosea is similar antiviral activity against virus infection.

Keywords: Remdesivir, *Rhodiola rosea*, Comparative protocol, Antiviral Activity, Salidroside and Rosarin

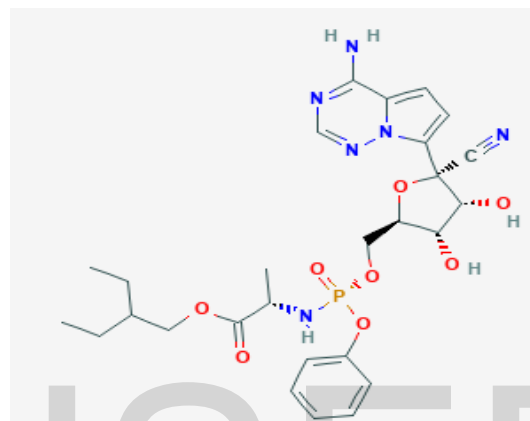
Introduction:

COVID- 19 is an Epidemic which is widely affecting and disturbing Human health worldwide. Corona viruses are a family of enveloped viruses with a positive, single-stranded RNA genome that contaminates animal species and humans. Between corona virus members are those responsible for the common cold, severe acute respiratory syndrome corona virus (SARS), Middle East respiratory syndrome-related corona virus (MERS), and the recently emerged severe acute respiratory syndrome corona virus 2 (SARS-CoV-2, the causative pathogen of the disease COVID-19 (Eastman 2020). Now days, Remdesivir is famously known as medicine for treatment of COVID- 19. Although, Remdesivir (RDV) is an investigational compound with a large range of antiviral ability against RNA viruses such as SARS-CoV and Middle East respiratory syndrome (MERS-CoV) (Gordon et al, 2020). But remdesivir as a treatment remains misty, even though liver and kidney risks are rising. In the Ebola trial, researchers found side effects of remdesivir (RDV) with increased liver enzyme levels that may indicate probable liver injure. Researchers revealed similar increases in liver enzymes in three U.S. COVID-19 patients (RXList). So, there is a quick need to search safe drug discovery and use which don't have any side effects. *Rhodiola rosea* is comes as better alternative to curing Viral diseases. It is known as commonly golden root. It's reported as Antiviral agent and it can improve cellular immunity and humoral immune purpose. Both Remdesivir (RDV) and *Rhodiola rosea* has similar activity which is Antiviral activity. Although, Remdesivir (RDV) is chemically synthesized different structure in comparison to *Rhodiola rosea* active compounds structures. This present study is focused on the comparative study about structure and Mode of action against virus for Remdesivir and active compounds of *Rhodiola rosea*. Consistent with previous reports, our data demonstrate that *Rhodiola rosea* contains compounds that take action as antiviral agents. *Rhodiola rosea*, a medicinal plant has recently been reported to contain active compounds with antimicrobial

action and antiviral action. The purpose of this study is to compute the antiviral action and antibacterial properties of the bioactive metabolites of *Rhodiola rosea* in the serum of experienced marathon runners other supplementation. *Rhodiola rosea* have enhanced capability of antiviral action and also rupture the duplication and replication of virus(Maryan Ahmed et al, 2015).

Remdesivir

Molecular Formula: C₂₇H₃₅N₆O₈P



Structure of Remdesivir (Source-Pubchem)

Remdesivir is a prodrug of an adenosine triphosphate (ATP) analog, with prospective antiviral activity against a diversity of RNA viruses. Upon direction, remdesivir, being a prodrug, is metabolized into its active form GS-441524. As an ATP analog, GS-441524 fights with ATP for integration into RNA and inhibits the act of viral RNA-dependent RNA polymerase. This marks in the pause of RNA transcription and decreases viral RNA production.

Remdesivir, or GS-5734, is an adenosine triphosphate analog first Identified as a potential treatment for Ebola (Jacobs et al 2016). In 2017, its activity against the coronavirus family of viruses was also demonstrated. Remdesivir is also being reported as a possible treatment to SARS-CoV-2, the coronavirus accountable for COVID-19 (Wang et al 2020). Remdesivir was arranged an FDA Emergency Use Authorization on 1 May 2020. This is not the similar as an FDA approval (U.S. Food & Drug, 2020).

Remdesivir: Mode of Action against COVID- 19

Sequence of attack of COVID- 19 in host cell-

1. SARS-CoV-2 chiefly infects the respiratory tract (nasal epithelial cells, pneumocytes, and alveolar macrophages) and the gastrointestinal tract (enterocytes).

2. The virus enters through straight communication connecting the viral S protein and the cellular receptor angiotensin-converting enzyme 2 (ACE2).
3. Then, the viral genome is released and converted into the viral replicase poly proteins PP1a and PP1ab, which are cleaved into functional proteins by viral proteases.
4. Viral genome replication is mediated by the viral replication complex, including the RNA-dependent RNA polymerase (RdRp).
5. Viral nucleocapsids are assembled from the packaged viral genomes and translated viral structural proteins and released through exocytosis and infection increased (Eastman et al., 2020).

Mode of Action of Remdesivir-

It works as nucleoside/nucleotide analogues to inhibit viral genome replication that's how it controls the viral multiplication. It attacks step no. 4 and becomes a mimic structure and binds to its respective receptor and stops the process (Eastman et al., 2020).

Rodiola rosia:

Rhodiola rosea is known as commonly golden root, rose root, roseroot Aaron's rod, Arctic root, king's crown, *lignum rhodium*, orpin rose. It is a perennial flowering plant in the family Crassulaceae (Plants for a Future. 2012) (Drugs.com. 2019). It grows as wild in nature in Arctic regions of Europe (including Britain), Asia, and North America, and can be propagated as a groundcover. *Rhodiola rosea* has been known as source in traditional medicine for several disorders, particularly including treatment of anxiety and depression (US National Institutes of Health. September 2016).

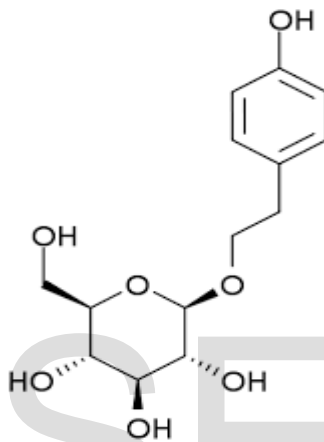
Rhodiola rosea, a common Tibetan medicine, is mainly used in the treatment of conditions including hot phlegm cough, haemoptysis, injuries, burns, leucorrhoea and diabetes (10). Modern pharmacological studies have shown that *Rhodiola rosea* has the following effects: Anti-ageing, anti-fatigue, anti-oxidant, anti-tumor and anti-viral effects, as well as enhancement of learning memory, resistance to microwave radiation, enhancement of immunity, protection of the viscera, enhancement of the physique, improvement of haematopoietic function, resistance to fatigue, lowering of blood sugar and prevention of altitude sickness (Zhu et al 2004). *Rhodiola rosea* is highly effective in the treatment of diabetes (Li et al 2011), ischaemic heart disease (Zhong et al, 2010) and free radical injury

during cerebral ischaemia-reperfusion (Lee et al, 2013; Spanakis et al 2013). Salidroside is one of the major active components of *Rhodiola rosea* (Guan et al, 2011).

This plant root has 2 major contents, which shows antiviral activity against various viruses Salidroside and Rosarin.

Salidroside

Chemical formula- $C_{14}H_{20}O_7$

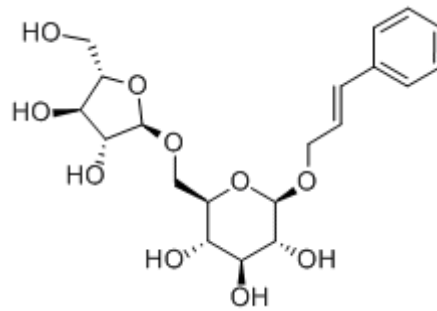


Chemical structure of Salidroside (Source-Pubchem)

Salidroside, a major bioactive component of *Rhodiola rosea* has been reported to amend the expression of antiviral cytokines such as IFN γ , and TNF α , and slow down the replication of coxsackievirus B3 perhaps during inflection of oxidative stress (Wang et al., 2009; Zhu et al., 2010). More recently, studies have shown that *Rhodiola* reduced dengue virus multiplication through controlling the innate immune response genes, RIG-I, MDA5 and ISG to promote an effective antiviral immune response (Diwaker et al., 2014). Engaged jointly, this information emphasizes the antiviral ability of *Rhodiola rosea* and it's possible as a therapeutic scheme alongside a diversity of infectious diseases.

Rosarin

Molecular Formula: $C_{20}H_{28}O_{10}$



Chemical structure of Rosarin (Source-Pubchem)

Mode of Action of *Rodiola rosea* against COVID- 19

In current years, *in vitro* experiments as well as animal experiments have reported that *Rhodiola rosea* can improve cellular immunity and humoral immune purpose (Lu et al, 2013). The current revise aimed to resolve whether *Rhodiola rosea* extract is able to improve the expression of TIPE2, decrease thymus T-lymphocyte apoptosis and get better immunity. By observing changes in thymus T lymphocytes, TIPE2 and immune cells in mice with sepsis which were pre-treated with *Rhodiola rosea* extract, this study aimed to elucidate the immune regulatory method of *Rhodiola rosea* (Ming-Wei Liu 2015). Salidroside exhibited understandable antiviral effects both in *in vitro* and *in vivo* experiments. Salidroside was establish to adapt the mRNA expression of interferon-g (IFN-g), interleukin-10 (IL-10), tumor necrosis factor-a (TNF-a), and interleukin-2 (IL-2) (Wang et al. 2009). But also of salidroside, focusing especially on its antioxidant, immunomodulatory, antitumoral, and antiproliferative action, as well as to describe their therapeutic significance in disease management (Mari-Carmen Recio et al 2016).

Conclusion-

Remdesivir act directly on virus to stop multiplication against virus but the *Rhodiola rosea* act naturally to enhance immunity against virus replication. Remdesivir is an ATP analogue, which suppress the replication and multiplication process of viral genome. But remdesivir as a treatment is reported as risky for liver and kidney risks. Researchers found side effects with increased liver enzyme levels. Consequently there is a rapid require to look for secure medicine innovation and employ which don't have any side effects. *Rhodiola rosea* is can be

a better alternative to curing viral diseases. It's well known antiviral agent and it can progress cellular immunity and humoral immune purpose. Remdesivir (RDV) is chemically different structure with *Rhodiola rosea* active compounds structures which are Salidroside and Rosarin. Although, both Remdesivir (RDV) and *Rhodiola rosea* has similar antiviral activity.

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