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Effect of *Nilavembu kudineer* in the Prevention and Management of COVID – 19 by inhibiting ACE2 Receptor

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Keywords

Nilavembu Kudineer, COVID-19, NCoV-19, Siddha Medicine, Anti-viral Herbs, ACE2 enzyme receptor, In-silico Molecular Docking analysis**.**

Background

Novel Corona virus is making its Worldwide propagation in a very fast phase. It is now essential to discover the drugs that are useful in the prevention and management of **NCoV-19**. Many traditional Herbs and Poly Herbal synergistic formulations are useful in the prophylaxis of various types of Viruses. In Siddha system of medicine, there are various medicines used for antiviral therapies. *Nilavembu kudineer* is a very remarkable medicine which is already recognized by the Government of Tamilnadu during the eradication program of Dengue and Chikungunya viruses.

To prove safety and efficacy of a traditional medicine, **Reverse pharmacology** method is recognized globally. Reverse pharmacology is confirming the safety and efficacy of a medicine which is already in clinical practice by going back in the steps of pharmacological screening and drug development. The ultimate aim of the Reverse pharmacological research is to find the mechanism of action by a drug against a disease. For *Nilavembu kudineer* (Mentioned in the Siddha text *Siddha Vaithiya Thirattu*), clinical documentations and various pre-clinical studies on its safety and efficacy are already done. In this study, we have done the **In-silico Molecular Docking Analysis** of the Bio-active compounds found in the aqueous extract of Nilavembu kudineer chooranam against the **ACE2 enzyme receptor** which is the route of entry in the pathogenesis of Novel corona

virus. Clinical study needs to be done to confirm the proposed efficacy of the *Nilavembu kudineer* in the prevention of the Novel Corona Virus.

Materials and Methods

Extract Preparation

Aqueous extract of *Nilavembu Kudineer Chooranam* was prepared so that it may increase the concentration of the water soluble and non-volatile bioactive compounds. The concentration of such compounds is further increased and specificity is increased by processing it in the rotatory evaporator.

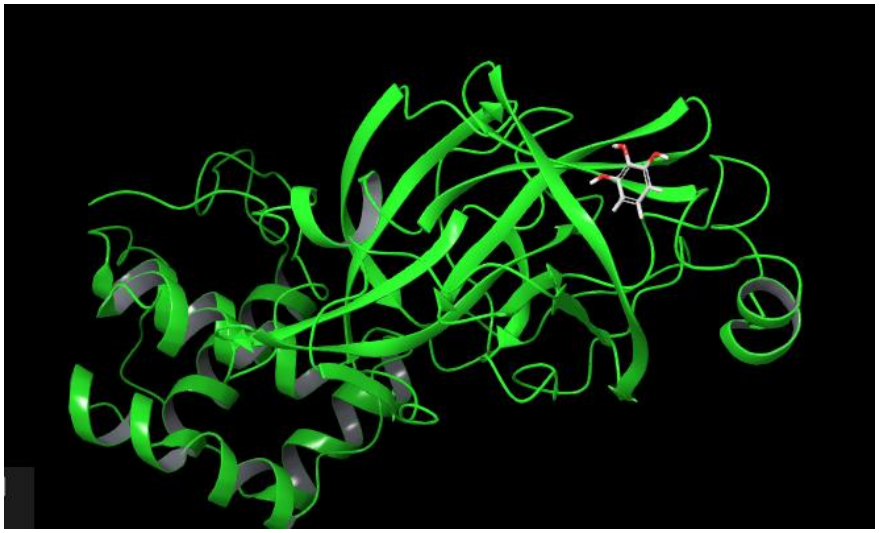
Finding Bio-Active Compounds and Molecular Docking studies

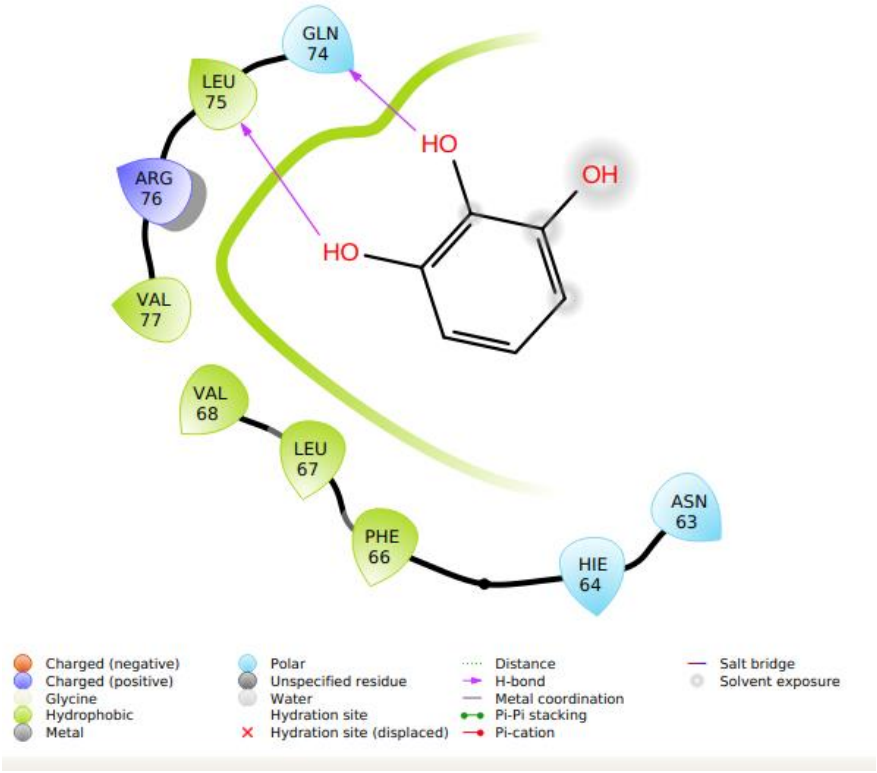
Bio-Active Compounds are isolated using (GC-MS) Gas Chromatography method and Mass Spectrometry method. The identified molecules are docked with ACE2 receptor which is identified as the functional receptor for both the SARS corona virus and the novel corona virus.

Results

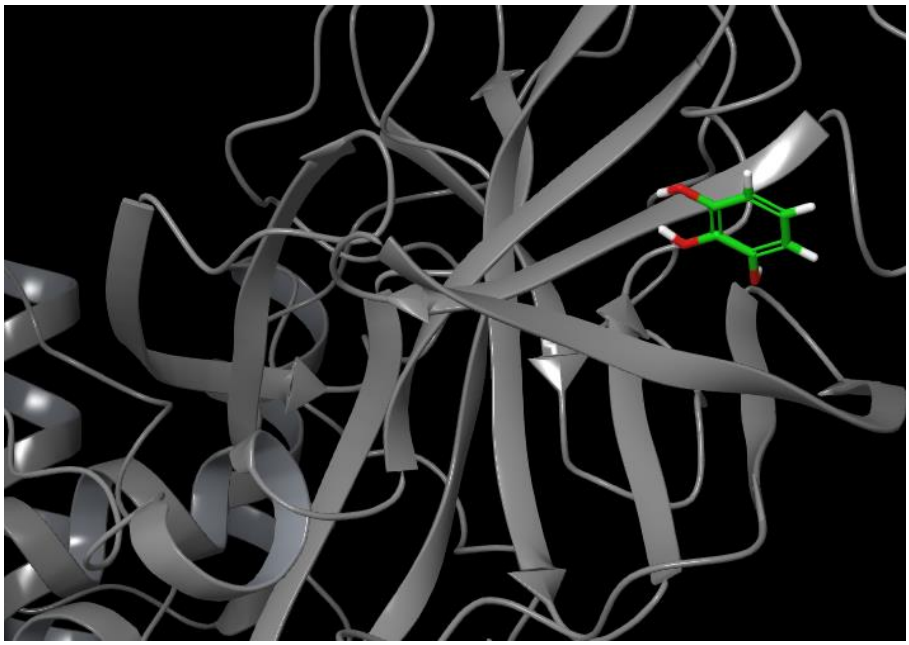
Results show that Benzene 123 Triol, which is found in the aqueous extract of Nilavembu Kudineer Chooranam is found to bind against the ACE2 receptor. There are four active sites in this unique compound where it can bind with ACE2 receptor. The site 1 showed the highest affinity towards ACE2 receptor with low glide score of -6.185 Kcal/mol.

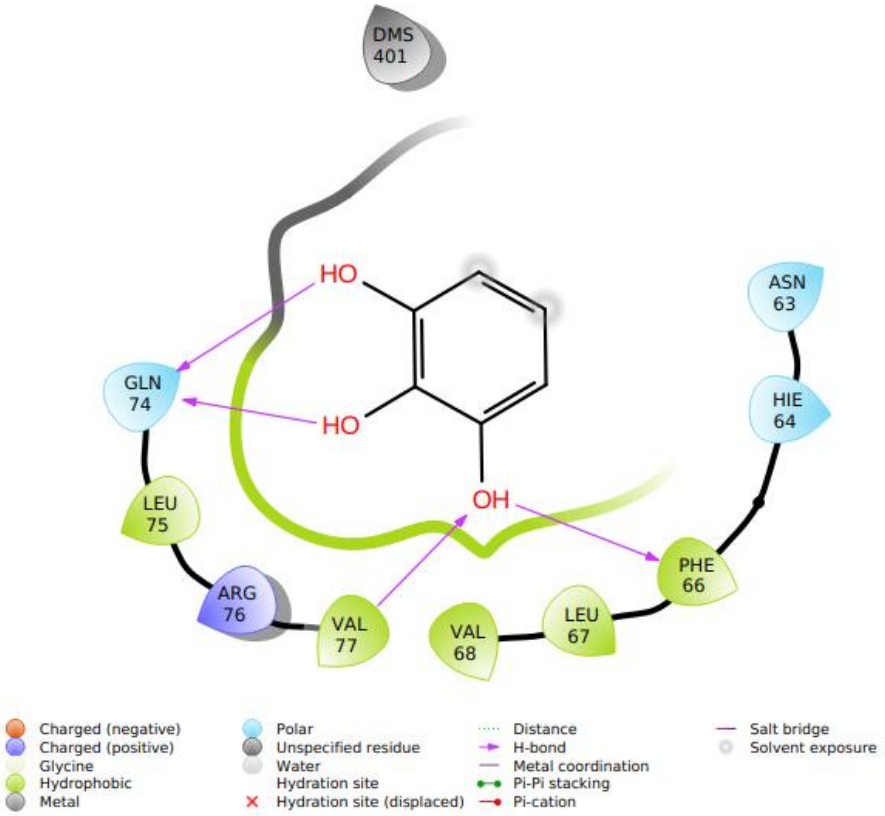
Active Site: 1



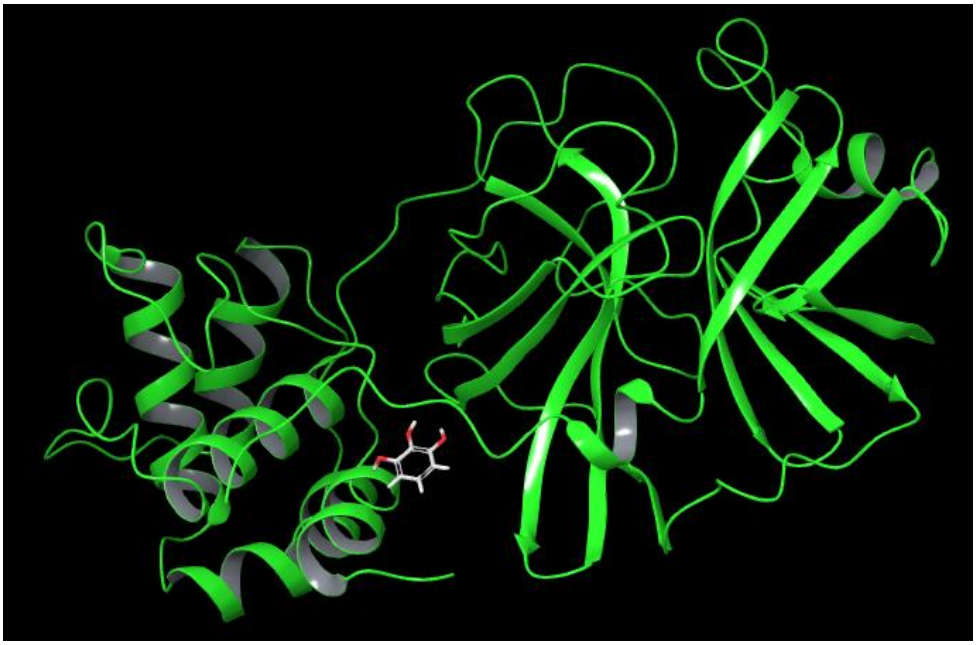


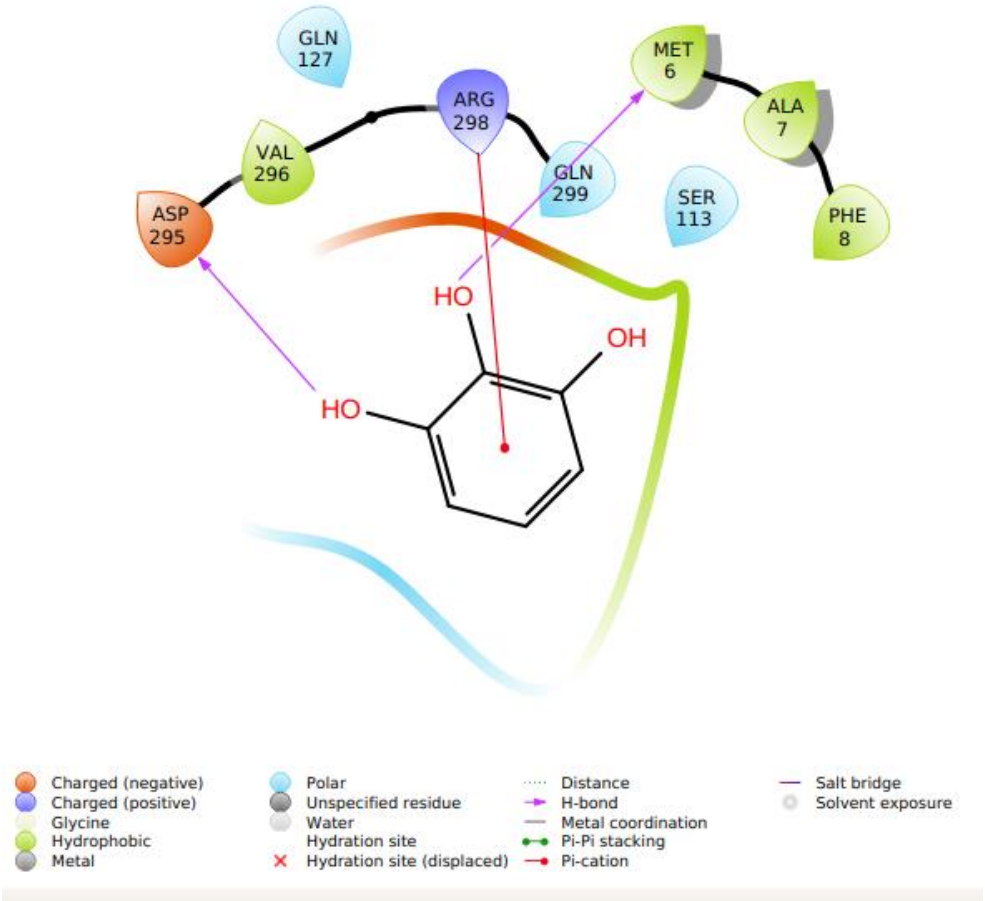
Active Site: 2



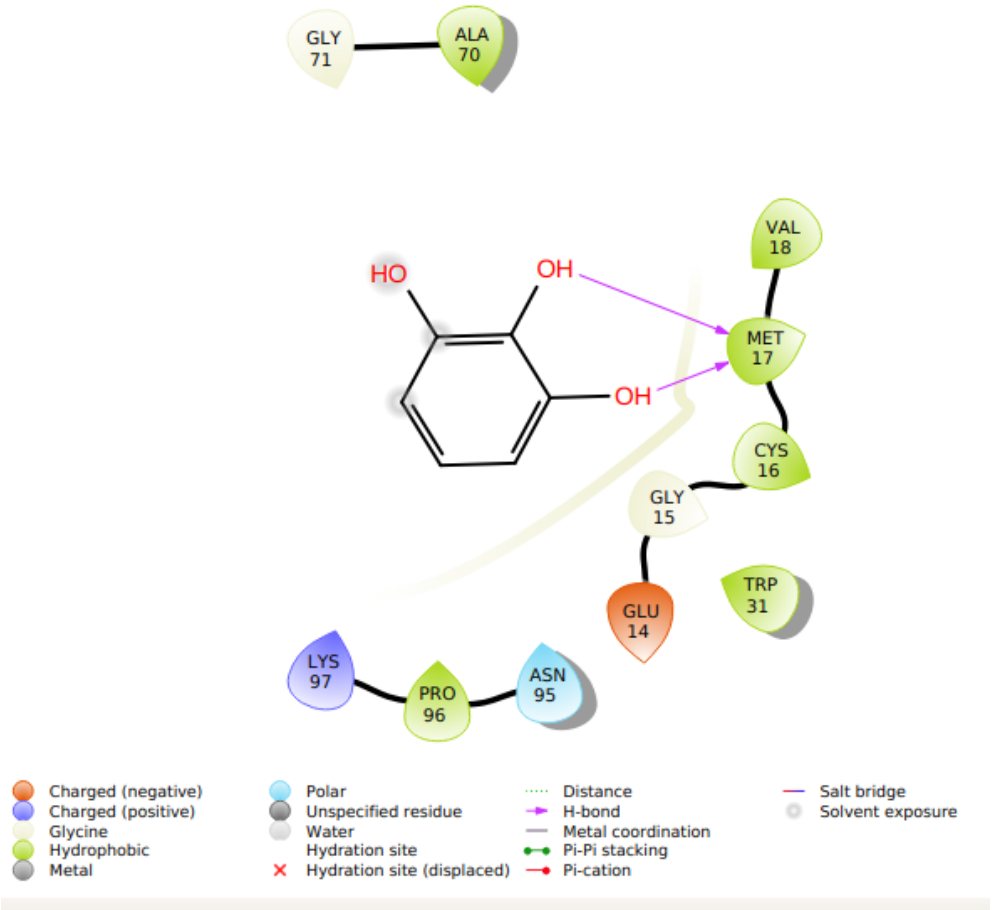


Active Site: 3





Active Site: 4



PDB : 6Y84
Experimentaly proven active sites
Site 1 :
1) Benzene-1,2,3-triol, ID: C87661 ------ -6.185
Site 2 :
1) Benzene-1,2,3-triol, ID: C87661 ------- -5.405
Site 3 :
1) Benzene-1,2,3-triol, ID: C87661 -------- -5.993
Site 4 :
1) Benzene-1,2,3-triol, ID: C87661 -------- -4.570

Conclusion

Eventhough Molecular docking studies are considered as a preliminary study, it is significant with other Pre-clinical studies done by the Research scholars from various fields including in-vivo immuno-modulatory activity against viral infection in backyard chicken and in-vivo safety studies in wistar rats. This makes us clear that the *Nilavembu kudineer* has potent antiviral capacity. Our current work increases its specificity against Novel Corona Virus 2019. Clinical evaluation needs to be done to further prove the action of *Nilavembu kudineer* against COVID-19 by inhibiting the ACE2 enzyme receptor which is the route of entry of Novel corona virus in human beings.

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