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A NONCLINICAL SPECTROSCOPIC APPROACH FOR DIAGNOSING COVID-19: A CONCISE PERSPECTIVE

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With the COVID-19 outbreak, many challenges are posed before the scientific world to curb this pandemic. The diagnostic testing, treatment, and vaccine development for this infection caught the scientific community's immediate attention. Currently, despite the global proliferation of COVID-19 vaccination, the specific treatment for this disease is yet unknown. Meanwhile, COVID-19 detection or diagnosis using polymerase chain reaction (PCR)-based methods is expensive and less reliable. Moreover, this technique needs much time to furnish the results. Thus, the elaboration of a highly sensitive and fast method of COVID-19 diagnostics is of great importance. The spectroscopic approach is herein suggested as an efficient detection methodology for COVID-19 diagnosis, particularly Raman spectroscopy, infrared spectroscopy, and mass spectrometry.

Keywords: *COVID-19, coronavirus, polymerase chain reaction, spectroscopy.*

Introduction. The threat of the highly transmitting and pathogenic coronavirus disease has increased since the outbreak of this pandemic. The disease has been characterized as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1] because the genetic analysis of the causative virus revealed phylogeny matching with SARS-CoV-1. The primary questions of knowing the origin of this dreadful virus and its man transfer still remain unexplored. The current rate of its rapid human-to-human transfer is widely known. As a result, the quarantine and other preventive measures (self or administrative) have received immense attention. The ideas of physical distancing and the use of sanitizers have spread worldwide [2]. Due to the pandemic, drugs with antiviral and anti-inflammatory properties are used as leading drug compounds to combat this disease. Due to the unavailability of any clinically approved drug against COVID-19, some broad-spectrum antiviral drugs in clinical trials led to the successful recovery of the affected people. This clinical methodology still stands in practice across the globe.

In the human body, the defense/immune system is always responsive to invading microbes, heat, or other toxins in a particular tissue. This responding behavior appears in inflammation, fever, color change, etc. The inflammatory response is mainly expressed by the release of bradykinin, histamine, and prostaglandins by the affected cells, which induces fluid leakage from blood vessels into the respective tissues, thereby causing swelling. Generally, NSAIDs, a class of drugs called nonsteroidal anti-inflammatory drugs, are administered to counter this inflammatory action. These include both selective as well as nonselective inhibitors. The COX2 inhibiting drugs like rofecoxib, celecoxib, and valdecoxib are selective inhibitors, while ibuprofen, diclofenac, aspirin, and naproxen are nonselective ones. In the corona viral infectious state, this countering mechanistic way has raised some concerns associated with the possibility of increased adverse effects [3, 4]. Some evidence indicates the influential role of NSAIDs in treating COVID-19. However, prudent control is needed until further evidence sheds light on this viral strain [5]. Some old antimalarial drugs like chloroquine have shown noteworthy results against COVID-19 [6]. From the literature survey, it is evident that this drug possesses the antiviral potential of broad-spectrum action. In this context, the endosomal pH with the glycosylation of SARS-CoV receptors is highly significant [7, 8]. Hence, as expected, chloroquine represents a potent agent in treating COVID-19 pneumonia. Similarly, several other examples of

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