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COVID-19 Vaccines Development: Challenges and Future Perspective

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) outbursts began at the end of 2019, which imposed a serious crisis on public health and the economy all over the world. To date, there is no antiviral drug available for SARS-CoV-2, and hence vaccination is the most preferred method to prevent people from getting attacked by this virus, especially for those who are at high risk. To counter coronavirus-2, there are various types of vaccines, which are being used, such as live attenuated vaccines, killed or inactivated vaccines, recombinant vaccines, mRNA vaccines, recombinant vector vaccines, and DNA vaccines. Novavax data shows that the vaccine is effective against severe diseases caused by B.1.351. The Pfizer-BioNTech and AstraZeneca vaccines show evidence of some protection against P.1. Due to the immune response, the Human body can recognize and protect itself against harmful foreign substances such as bacteria, viruses, and microorganisms. The immune system protects our body from these harmful substances by identifying them as antigens. Virus-infected cells release many chemicals such as chemokines and cytokines for the initiation of immune response. To control the pandemic situation, herd immunity is required by the immunization of a critical mass of the world population at once. In this review article, we have made an analysis of the immune response of the human body to SARS-CoV-2 infection, different types, and modes of action of SARS-CoV-2 vaccines along with the current status of vaccines.

Research Article **Published Date:- 2025-04-01**

Dengue Epidemic during COVID-19 Pandemic: Clinical and Molecular Characterization – A Study from Western Rajasthan

The concurrent emergence of dengue fever and the COVID-19 pandemic posed significant challenges to India's healthcare system, particularly in Western Rajasthan, a region characterized by its arid climate and unique socio-demographic conditions. This study aimed to investigate the clinical and molecular characteristics of dengue during the COVID-19 pandemic, focusing on trends, diagnostic challenges, and serotype distribution.
Conducted at Dr. S.N. Medical College, Jodhpur, in 2021, the study included 550 dengue-positive patients confirmed via rapid diagnostic tests and further analyzed using Dengue NS1 antigen and IgM antibody ELISA. Molecular characterization was performed using RT-PCR for serotyping.
The results revealed a male predominance (72.36%) and a higher incidence in the 21–30-year age group (39.09%). Urban areas accounted for 67.73% of cases, with significant NS1 and IgM positivity ($p = 0.042$ and $p = 0.004$, respectively). Most cases (86.91%) were managed outpatient, though IgM positivity was significantly higher among hospitalized patients (19.19%, $p < 0.001$), indicating severe or prolonged infections. Platelet counts were above 100,000/mm³ in 86.91% of cases, with only 0.37% showing critically low counts (< 20,000/mm³). Seasonal analysis showed a peak in October (n = 325), correlating with post-monsoon vector breeding. Serotyping identified DENV2 as the dominant strain (97.42%), associated with severe dengue manifestations, including Dengue Haemorrhagic Fever (DHF).
The study highlights the dual burden of dengue and COVID-19, emphasizing the need for enhanced vector control, improved diagnostic strategies and public health interventions during overlapping outbreaks. The predominance of DENV2 underscores the importance of serotype-specific surveillance and preparedness to mitigate future dengue epidemics in the region.

Research Article **Published Date:- 2025-02-18**

Mass Serological Screening in the Armed Forces Using the Serum-Pooling Method. Analytical Evaluation of the Chemiluminescence Method

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Mass serological screening in the Armed Forces involves detecting serological markers of chronic infections, particularly viral hepatitis B and C, syphilis, and HIV among young military recruits. The objective of this study is to evaluate the analytical performance of the chemiluminescence technique (CMIA-Architect i2000 SR) in mass serological screening using the serum-pooling method at the virology laboratory of the Mohammed V Military Teaching Hospital.
Samples with known serological results (positive/negative) were grouped into pools of different sizes (2, 5, 10, and 15 sera). These pools were tested using chemiluminescence (CMIA-Architect i2000 SR). A cost analysis was conducted to assess potential savings based on seroprevalence and pool size.
Results showed that the pooling method maintained 100% specificity. Overall sensitivities for detecting positive samples were 93.1% for HBV, 83.33% for HCV, and 86.36% for HIV. Positive and negative predictive values were high for all three viral markers, highlighting the reliability of the pooling method. Additionally, this approach generated significant cost savings, ranging from 46% to 80%.
Conclusion: This study demonstrated the solid analytical performance of the chemiluminescence technique (CMIA-Architect i 2000 SR) using the serum-pooling method for detecting HBV, HCV, and HIV serological markers in low-seroprevalence regions.