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COVID-19 mRNA Vaccines are Safe and Effective

Ciprian Silaghi[1], Madalina Bordea[2], Gina Klein[3], Corina Tritean[3], Genel Sur[3,4], Cornel Aldea[3,4], Gabriel Samasca[3,5,*], Teodora-Larisa Timis[6], Ioan-Alexandru Florian[7], Peter Makovicky[8], Pavol Makovicky[9], Kvetoslava Rimarova[10]

[1]Department of Biochemistry, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
[2]Department of Microbiology, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
[3]Emergency Hospital for Children, Cluj-Napoca, Romania
[4]Department of Pediatrics II, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
[5]Department of Immunology, Iuliu Hatieganu University of Medicine and Pharmacy
[6]Department of Physiology, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
[7]Department of Neurosurgery, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
[8]Biomedical Research Center of the Slovak Academy of Sciences, Institute of Experimental Oncology, Bratislava, Slovak Republic
[9]Department of Biology, Faculty of Education, Selye Janos University, Komarno, Slovak Republic
[10]Department of Public Health and Hygiene, Faculty of Medicine, P. J. Šafárik University, Košice, Slovak Republic
*Corresponding author: silaghiciprian@yahoo.com

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Abstract mRNA vaccines are a novelty in the medical world. The researchers created these vaccines in a short time, which led to many question marks. In this article, we have analyzed the perception of the world's countries on these vaccines.

Keywords: *mRNA vaccines, new vaccines, causes of mistrust*

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1. Introduction

The COVID-19 mRNA vaccines represent a new group of vaccines being produced [1]. These vaccines consist of synthetic mRNA strands encoding the SARS-CoV-2 Spike glycoprotein, packaged in lipid nanoparticles to deliver mRNA to cells [2]. BNT162b2 and mRNA-1273, manufactured by Pfizer/BioNTech® and Moderna®, respectively, contain nucleic acid and mRNA and can activate our human cells to accept protein factories to make the antigen (viral spike protein) that will elicit an immune response [3]. COVID-19 Moderna and Pfizer vaccines prevented infections as well as symptoms [4]. Three vaccines had efficacy >90% Pfizer-BioNTech (~95%), Moderna (~94%), and Sputnik V (~92%) [5]. Estimated mRNA vaccine effectiveness, for prevention of infection, was 90% for full immunization and 80% for partial immunization [6]. But the key issues were vaccine durability and [7] efficacy against specific SARS-CoV-2 circulating variants [8]. BNT162b2 and mRNA-1273 elicited specific and neutralizing antibodies concentrations among COVID-19 patients convalescent 'serum in the first 100 days after COVID-19 vaccination [9]. Extending the interval between COVID-19 vaccine doses posed a risk to the elderly as a result of low immunogenicity to the vaccine [10]. But a single dose of the vaccine was enough to induce an effective response in previously infected patients [11]. The viral load was substantially reduced for infections occurring 12-37 days after the first dose of the BNT162b2 vaccine [12]. We aimed to analyze the new vaccines 'perception in the general population. We also wanted to analyze the causes of mistrust in the new vaccines. Furthermore, we searched the PubMed database with the keywords, "COVID-19 vaccines" and analyzed all relevant articles for our aim.

2. World Perception of the COVID-19 Vaccine

COVID-19 vaccination is of capital and paramount importance to health integrity [13,14]. Successful management of the COVID-19 pandemic contributed to the intention of COVID-19 vaccination uptake [15]. Erroneous social news reports have complicated personal decision-making, leading to people with lower cognitive ability test scores being vaccine-hesitant [16]. The most common reason for COVID-19 vaccination refusal was doubt of health care, correctional, or government staff or institutions (20.1%) [17]. Morocco obtained the highest COVID-19 vaccine rates in Africa in the first phase. The health ministry of this country has also deployed a large communications campaign to provide information, reassure and encourage people to get vaccinated [18].

Before emergency use authorization, only half of the United States adults intended to accept COVID-19 vaccines; most others (40%) were uncertain [19]. Now, more than 70 million people in the United States have received one or more doses of a COVID-19 vaccine [20]. In China, free vaccinations increased the COVID-19 vaccination willingness rate [21]. Healthcare workers in Asia, including China, India, Indonesia, Singapore, Vietnam, and Bhutan, were willing to receive the COVID-19 vaccination [22]. Public service and the common good helped the government promote vaccination programs in the Philippines [23]. In Colombia, there was a high perception of the intention to vaccinate physicians against COVID-19, and this was very similar to that of the general population [24]. There was a need to regularly implement social distancing policies in the Nordic region. The vaccines were used to prevent outbreaks and cut the burden of patient hospitalizations on nursing and medical staff [25]. In Israel, younger people wanted to protect their families and their relatives (96.7%). They seed vaccination as an act of civic responsibility (91.9%) and expressed strong confidence in their healthcare providers (87.7%) [26]. In Japan, the perceived effectiveness of the vaccine and willingness to protect others played a critical role in the COVID-19 vaccine acceptance [27]. In Italy, the percentage of participants willing to be vaccinated against COVID-19 assessed by either-or questions was >90% (28). The intention to get vaccinated or intake of the COVID-19 vaccine among older Germans were positively related to the perceptions of enhancing infected, perceptions of the potential long-term effects ‘severity, the vaccine's efficacy, and the benefits of vaccination [28]. In Canada, there was a demand to discuss common misconceptions among workers supporting adults with intellectual disabilities to serve as vaccine promoters in their communities [30]. Also, still in Canada, those living with obesity were highly ambivalent about COVID-19 vaccination, so the need for patient-centred counselling was necessary [31]. In Poland, the percentage of COVID-19 vaccine acceptance among healthcare workers remained unsatisfactory [32]. The acceptance rate of the COVID-19 vaccine in the Saudi population was low. Varied interventions were necessary for raising awareness and emphasizing the safety and efficacy of the COVID-19 vaccine [33]. In Jordan, the high prevalence of COVID-19 vaccine hesitancy and its association with conspiracy beliefs was present among university students [34].

3. Populations at Risk

In the United Kingdom, smokers have more negative attitudes towards vaccines in general and were more likely to be unsure or unwilling to vaccinate against COVID-19, compared with the control group [35]. A European study revealed that supporting information on COVID-19 vaccines should also be provided to pregnant and breastfeeding women to avoid unfounded worries about the vaccines and to support shared decision-making in this population [36]. In the United States, COVID-19 mRNA vaccines generated humoral immunity in pregnant and lactating women, with immunogenicity and reactogenicity similar to that observed in the control group. Natural infection immunity responses were lower than vaccine-induced immune responses. Immune transfer to neonates appeared via the placenta and breast milk [37]. In France, Benotmane et al. observed a weak anti-SARS-CoV-2 antibody response after the first dose of mRNA COVID-19 vaccine in kidney transplant patients [38].

4. Side Effects

A new Centers for Disease Control and Prevention report revealed that a rate of 4.5 severe allergic reactions occurred among 1 million patients vaccinated with the mRNA-based COVID-19 vaccines until February 2021 [39]. A study from the World Allergy Organization Journal recommended patients with a history of anaphylaxis, from other or unknown causes, as a criterion for allergist-immunologists to further orientation [40]. Allergists' competence in the diagnosis and treatment of allergic reactions was vital for the screening of high-risk patients [41]. In the United States, Waheed et al. reported a patient diagnosed with Guillain-Barre Syndrome after receiving the first dose of the Pfizer - COVID-19 vaccine [42]. In China, Shi et al. observed an abnormal immune function in neurodegenerative diseases, which can substantially affect the safety and effectiveness of vaccines [43]. The current studies indicated a minor risk of acute neurological disorders [44]. In the United States, Chilimuri et al. reported a patient diagnosed with relapsing-remitting multiple sclerosis on B cell depleting therapy after the COVID-19 vaccine [45]. The adverse events for both vaccines were mild to moderate, with many injection-site reactions and fatigue in India. Deva Priya et al. reported no serious adverse events [46]. In the United Kingdom, mRNA vaccines caused milder, less frequent systemic side effects but more local reactions [47]. In Israel, Hiller et al. reported three patients who developed lymphadenopathy after the first dose of the Pfizer-BioNTech COVID-19 vaccine, but with a gradual regression in the enlarged nodes until complete resolution. [48]. In the Doppler echocolor study of patients who reported lymphadenopathy after the BNT162b2 Pfizer vaccine in Italy [49], no anomaly was found. Malayala et al. reported a case of purpuric rash and thrombocytopenia after receiving the first dose of the m-RNA-1273 Moderna vaccine in the United States [50]. Ackerman et al. reported a persistent maculopapular rash after the first dose of the Pfizer-BioNTech COVID-19 vaccine in France [51]. Li et al. recommended studying age, sex, and variation between databases if background adverse events of special interest rates are compared to event rates observed with COVID-19 vaccines [52].

5. Conclusions

Immunizing the entire population is a public health issue in which all countries must participate. Work and social involvement in the COVID-19 pandemic are needed. We have not found any serious clinical manifestations of mRNA vaccines.

The following public health measures are required: 1. The availability of COVID-19 vaccines at low cost in all

countries; 2. The use of masks covering the mouth and nose until the entire population has been immunized against COVID-19.

Conflicts of Interest

The authors declare no potential conflicts of interest.

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